FISCAL YEAR 1983 NOAA AUTHORIZATION

HEARINGS

BEFORE THE

SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT

OF THE

COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

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FISCAL YEAR 1983 NOAA AUTHORIZATION

TUESDAY, FEBRUARY 23, 1982

House of Representatives, Committee on Science and Technology, Subcommittee on Natural Resources, Agriculture Research and Environment,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10:07 a.m., in room 2325, Rayburn House Office Building, Hon. James H. Scheuer (chairman of the subcommittee) presiding.

Present: Representatives Scheuer, Brown, Blanchard, Walgren, White, Carney, Schneider, and Sensenbrenner.

Mr. **Scheuer**. The Subcommittee on Natural Resources, Agricultural Research and Environment will come to order for the first of a comprehensive set of hearings on the operational and research activities of NOAA, the National Oceanic and Atmospheric Administration, with specific reference to their atmospheric, their climatic, and their ocean pollution programs.

Now I am going to revise and extend my remarks at this time. Congresswoman Schneider and I have to go to a briefing on the Law of the Sea, so for the next half hour or 40 minutes I am going to turn the gavel over to the distinguished colleague from California, George Brown, formerly chairman of this committee and now chairman of a committee on agricultural research on the Agriculture Committee, a very distinguished and contributing member of this committee.

Thank you very much, Congressman. We will be back as soon as the other hearing is over.

Mr. **Brown**. Are you sure you want to leave?

Mr. **Scheuer**. Yes, we have to.

Mr. **Brown**. I will be happy to take over this function temporarily. May I say that I have a deep and longstanding concern with the health of the Weather Service, as well as many of the other functions of NOAA in connection with our responsibilities in this committee. I also have an increasing concern with some aspects of this as a result of my responsibilities in the Agriculture Committee, where I chair a subcommittee that deals with agricultural research.

For both of these reasons I consider this to be a very important hearing this morning to discuss the program for next year in this important area.

[The opening statements of Mr. Scheuer and Mr. Carney follow:]

OPENING STATEMENT
HONORABLE JAMES H. SCHEUER
FEBRUARY 23, 1982

THE SUBCOMMITTEE WILL COME TO ORDER.

TODAY WE BEGIN A SERIES OF AUTHORIZATION HEARINGS BY THE SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH, AND ENVIRONMENT FOR THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION.

IT IS OUR INTENT DURING THESE HEARINGS TO EXAMINE IN A COMPREHENSIVE MANNER THE OPERATIONS AND RESEARCH ASSOCIATED WITH NOAA'S ATMOSPHERIC, CLIMATIC, AND OCEAN POLLUTION PROGRAMS.

INCLUDED IN THESE AREAS ARE A VERY BROAD RANGE OF ACTIVITIES, INCLUDING THE NATIONAL WEATHER SERVICE,

ENVIRONMENTAL DATA AND
INFORMATION SERVICE,
WEATHER MODIFICATION RESEARCH, ACID RAIN RESEARCH,
GREAT LAKES RESEARCH,
CLIMATE ACTIVITIES, AND
OCEAN POLLUTION RESEARCH
AND MONITORING.

MANY OF THESE ACTIVITIES IN NOAA PROVIDE BOTH FUNDAMENTAL KNOWLEDGE AND DATA BEARING ON THE MOST IMPORTANT PROBLEMS THAT WE FACE IN THE AREA OF RESOURCE MANAGEMENT AND ENVIRONMENTAL PROTECTION.

NOAA RESEARCH AND SERVICE ACTIVITIES PROVIDE ESSENTIAL WEATHER INFORMATION WHICH IS USED NATIONALLY AND ON A WORLDWIDE BASIS.

THIS ASPECT OF NOAA'S ACTIVITIES IS THE SUBJECT OF TODAY'S HEARING.

THE ADMINISTRATION'S FY 1983 BUDGET REQUEST FOR THE NATIONAL

WEATHER SERVICE WOULD CLOSE 45 WEATHER STATIONS NATIONWIDE, DELAY PROCUREMENT OF NEW WEATHER RADAR SYSTEMS, ELIMINATE ONE OF THE NATION'S TWO POLAR-ORBITING WEATHER SATELLITES AND REDUCE OR ELIMINATE A VARIETY OF WEATHER SERVICES TAILORED TO AGRICULTURE, AVIATION AND FORESTRY.

THERE IS NO QUESTION THAT THIS BUDGET WOULD SEVERELY CURTAIL WEATHER SERVICES TO LOCAL COMMUNITIES ACROSS THE COUNTRY.

IN TODAY'S HEARING WE WILL HEAR FROM A DISTINGUISHED CROSS-SECTION OF THOSE WHO MARKET WEATHER INFORMATION AND THOSE WHO ULTIMATELY USE THE INFORMATION.

A NUMBER OF MEMBERS -- FROM BOTH SIDES OF THE ASILE -- ARE CONCERNED THAT THE ADMINISTRATION'S PROPOSAL WILL NOT ADEQUATELY PROTECT THE PUBLIC'S WELFARE AND SAFETY.

WE INTEND TO EXAMINE THIS QUESTION AND, IF NECESSARY, INSURE THAT ESSENTIAL AND WORTHWHILE ACTIVITIES ARE CONTINUED.

OUR FIRST WITNESS WILL BE ONE OF THE MOST POPULAR AND COMPETENT TELEVISION METEOROLOGISTS, BOB RYAN FROM WRC (CHANNEL 4).

WE ARE ALL IMPRESSED BY THE ACCURACY OF YOUR NIGHTLY WEATHER REPORTS AND ARE PLEASED THAT YOU ARE ABLE TO BE WITH US THIS MORNING.

OPENING STATEMENT
HONORABLE WILLIAM CARNEY
FEBRUARY 23, 1982

THANK YOU, MR. CHAIRMAN. I, TOO, AM HAPPY TO BE HERE THIS MORNING FOR THE BEGINNING OF A SERIES OF HEARINGS ON THE RESEARCH AND SERVICE ACTIVITIES OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION CONDUCTED BY THE SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURAL RESEARCH AND ENVIRONMENT.

I CAN AGREE WITH YOU, MR. CHAIRMAN, THAT OUR ATTENTION AT THESE HEARINGS MUST FOCUS ON THE CONTINUATION OF THE ESSENTIAL AND WORTHWHILE ACTIVITIES WITHIN NOAA AND THE DETERMINAITON OF THE APPROPRIATE LEVEL OF FUNDING TO CARRY OUT THESE ACTIVITIES/SERVICES.

THESE, TOO, ARE THE GOALS OUR PRESENT ADMINISTRATION HAS COMMITTED ITSELF TO. BY FOCUSING ON ESSENTIAL, NECESSARY SERVICES AND BY ELIMINATING BUREAUCRATIC WASTE, THE DEVELOPMENT AND ADVANCEMENT OF SCIENCE AND TECHNOLOGY CAN PROCEED IN A MORE COST EFFECTIVE MANNER.

CERTAINLY IN THE FOREFRONT OF ALL OUR DECISTIONS IS THE PRIORITY THAT THE PUBLIC HEALTH AND WELL-BEING OF THE AMERICAN CITIZEN BE ASSURED. I AM CONFIDENT THAT CONGRESS AND THIS SUBCOMMITTEE WILL EVALUATE EVERY BUDGET LINE WITH THIS GOAL IN MIND.

WE HAVE HERE TODAY A BROAD SPECTRUM OF DISTINGUISHED WITNESSES WHO WILL PROVIDE INSIGHT INTO A NUMBER OF POLICY QUESTIONS WE, AS MEMBERS OF CONGRESS, MUST ADDRESS. PARTICULARLY, TODAY THE FOCUS WILL BE ON THE ROLE OF NOAA AS A WEATHER INFORMATION SERVICE.

WITH AN ESTIMATED FY83 NATIONAL DEFICIET OF 90-100 BILLION DOLLARS, IT IS NECESSARY FOR CONGRESS TO EVALUATE THE ROLE OF GOVERNMENT V.S. THE PRIVATE SECTOR.

-WHAT ARE THE APPROPRIATE LEVELS OF USER FEES FOR SPECIALIZED NOAA SERVICES AND SHOULD THESE FEES BE CHARGED?

-SHOULD THE PRIVATE SECTOR TAKE OVER THE OPERATION OF WEATHER SATELLITES? WHAT IMPLICATIONS ARE THERE, IF ANY, ON NATIONAL SECURITY AND INTERNATIONAL RELATIONS?

-WILL CENTRALIZING THE WEATHER SERVICE AND CLOSING DOWN LOCAL OFFICES PROVIDE EFFECTIVE MEANS OF GETTING WEATHER SERVICES TO THE PUBLIC?

THESE ARE JUST A FEW OF THE POLICY QUESTIONS THAT FACE US TODAY AND WITHOUT FURTHER DELAY, LET US HEAR FROM OUR WITNESSES AS THEY ADDRESS THESE AND OTHER QUESTIONS.

Mr. BROWN. Does anyone else have an opening statement?

Mr. CARNEY. Mr. Chairman, if I may, I would like to just simply say I'm happy to be here this morning for the beginning of the series of hearings on the research and service activities of the National Oceanic and Atmospheric Administration conducted by the subcommittee. I can agree with the chairman that our attention at these hearings must focus on the continuation of the essential and worthwhile activities of NOAA and the determination of the appropriate levels of funding to carry out these activities and services.

These, too, are the goals our present administration has committed itself to. By focusing on essential, necessary services and by eliminating bureaucratic waste, the development and advancement of science and technology can proceed in a more cost-effective manner. Certainly in the forefront of our decision is the priority that the public health and well-being of the American citizens be assured. I am confident the Congress, and in particular this subcommittee, will evaluate every budget line with that goal in mind.

We have here today a broad spectrum of distinguished witnesses who will provide insight into a number of policy questions we as Members of Congress must address. Particularly today the focus will be on the role of NOAA in the Weather Information Service, and I look forward to the information our guests will give us.

Thank you, Mr. Chairman.

Mr. BROWN. Thank you, Mr. Carney.

Before we introduce our distinguished first witness, one of our colleagues, Congressman Lawrence J. DeNardis, has a brief statement that he would like to offer on this subject, and as a matter of protocol I would like to recognize him to offer his statement at this time.

Mr. DENARDIS. Thank you very much, Mr. Chairman and members of the committee. I appreciate the opportunity to appear before you today to comment on an aspect of the proposed fiscal year 1983 for NOAA as it pertains to a weather station in my district located at Sikorsky Memorial Airport in Stratford, Conn.

I have a statement which I will turn over to the committee. I will not read it, but simply make this observation, 3 years ago the Sikorsky weather station was threatened. At that time I was a State Senator from the area, though not from that particular town. We joined with many other people—local, State, and Federal level—to oppose the closing for reasons that were well stated at the time and which I have stated again in this particular statement.

Again, we feel that the closure is not wise. The dollar savings are minuscule. We are talking about a very small station, but a station which serves the Long Island Sound Basin. In that particular area the weather is highly changeable. We have often heard remarks about the weather in New England. It is quite true in southern Connecticut as pertains to the Long Island Sound Area.

There are many people who are dependent upon this weather station. It is an extremely important source of information to boaters and to other people involved with the life of Long Island Sound, and I appeal to you to consider the importance of this station. I certainly sympathize with the desire to make reductions where reductions can be made, but I feel obliged to speak for this station and those people who are served by it. I thank you for the opportunity to make that appeal to you.

[The prepared statement of Mr. DeNardis follows:]

Testimony of the Honorable Lawrence J. DeNardis before the Subcommittee on Natural Resources, Agriculture Research and Environment Feb. 23, 1982

Mr Chairman and Members of the Subcommittee I appreciate the opportunity to appear before you today to comment on the proposed fiscal 1983 budget for the National Oceanographic and Atmospheric Administration (NOAA). I have only the highest praise for the outstanding services they have provided over the years. I regret, however that I appear to express my strong opposition to one phase of the proposed budget--the closing of the National Weather Service office at Sikorsky Memorial Airport in Stratford, Connecticut. This proposed closure, while jeopardizing accurate and up-to-date weather foecasting for those using the highly tempremental waters of Long Island Sound, will result in the saving of a grand total of $70,000, and in the process cost the jobs of four meterological technicians. The closing is, of course, a small but important facet of employee reduction and dollar ceilings established by the Department of Commerce for NOAA in which 45 of some 200 weather stations around the country will be closed. The criteria used to select the stations that may be closed may seem quite vaild on the surface, but in my view will prove to be shortsighted and dangerous if they become a reality.

The station at Sikorsky may be small in comparison to others proposed for closure, but its geographical location on Long Island Sound is vital to accurate weather information in the area. Its importance has obviously been recognized in the past with hundreds of thousands of dollars being expended on improvements. While it is true that other weather service offices are located within 125 miles of the facility, none can provide the split second forecasting so necessary for all types of craft using Long Island Sound. Anyone familiar with the area knows the swift nature of weather changes that can take place.

While these factors alone are ample justification for preserving the station, it must also be noted that Sikorsky Memorial Airport is currently a prime candidate by the Federal Aviation Administration (FAA) for the location of a multi-million dollar automated flight center. The flight center will provide weather and flight information for air traffic in souther New England. The computerized system will provide information to pilots via computer. The pilots currently receive such information by phone.

I urge you to reject this proposal just as it was rejected three years ago. I stand ready to offer any further information you may require in the future.

Mr. **Brown**. Thank you, Mr. DeNardis. Do you have any questions?

Mr. **Carney**. No, Mr. Chairman.

Thank you. Larry and I have a constituency that shares that same magnificent body of water, the Long Island Sound, and we have the same concerns, I can assure you.

Mr. **Brown**. I hesitate to point out to Mr. DeNardis that I have a small station in my district being closed also—— [Laughter.]

If it comes to choosing between yours and mine, I don't know which one will——

Mr. **DeNardis**. I'm just going to have to rest my case, Mr. Brown.

Mr. **Carney**. Mr. Chairman, perhaps that is what would distinguish a statesman from the rest of the crowd, you know.

Mr. **Brown**. All right. Now we have a distinguished public figure here this morning as our first witness. While I am sure it appears that we are trying to capitalize on his well-known public image, let us assume that our purpose here is to focus public attention on a much more important underlying problem with which we both have a deep concern. We are very pleased to have you here this morning to share in our considerations of this problem.

STATEMENT OF ROBERT T. RYAN

Mr. **Ryan**. Thank you, Mr. Chairman. It is not only an honor and a pleasure for me to present this statement, it is rare that an individual has the opportunity to explain a bit of what his profession is about and the opportunity to explain the benefits that it bestows on those it serves and how it could be so much better if not all the proposed budget cuts perhaps were made. I might hasten to add that while I am a meteorologist for WRC-TV, the NBC station here in Washington, the views I am presenting today are my own.

In considering the funding of our Nation's weather services, I think it is helpful to reflect on the history of meteorology and the task the meteorologist faces in trying to predict the weather.

Meteorology is really a rather young science. Consider a system which is on a sphere 8,000 miles across, consisting of different materials and different gases which have different properties, one of which happens to be water existing in different concentrations on that sphere, heated by a nuclear reactor 93 million miles away. Just to make life interesting, this sphere is oriented in such a way that as it revolves around this nuclear reactor, it is heated differently at different locations at different times of the year.

Someone is asked to watch this mixture of gases, a fluid about 20 miles deep covering an area of about a quarter of a million square miles, and to predict the state of that fluid at one point on that sphere 2 days from now. That in a rather brief and simplified form is the problem that weather forecasters have to face. Dealing with this complex system and seeking to understand it, observe it, and predict it is indeed a science.

Contrary to what some have heard, it is not an art, it is not a guessing game; it is as much a science as chemistry, biology, physics, or astronomy. It is, however, for better or for worse, and for which we meteorologists are sometimes eternally damned, the one science which seeks to regularly predict the future rather than being content with observing the present and reflecting on the past.

I think it is well to consider the state of the art in forecasting now and how far we have come utilizing the modern tools that we now have, satellites, high-speed computers, networks of observations which keep us informed, high-speed data communications networks, all of which are crucial to the state of the art of weather forecasting in being able to generate increasingly accurate forecasts.

And when one considers that there are estimates that 1,000 lives are lost, either directly or indirectly, due to the weather or weather-related events, and that the annual economic impact can run into perhaps the tens of billions of dollars, I think it is obvious the value of reliable day-to-day weather forecasting.

I draw as an example of how far we have come: Hurricane Frederick, in September 1979, which struck the gulf coast near Gulfport, Miss.; it was a major hurricane. Winds were 120 miles per hour and yet that hurricane had been observed for days through our modern weather satellites, had been tracked and predicted fairly accurately with the sophisticated numerical computer models we now have to keep us abreast of the weather and actually observe it as a fluid and as a science. Watches had gone out days in advance from the forecasters who were specialized in forecasting hurricanes. Evacuations had been undertaken and as the hurricane approached were continuously updated.

That hurricane struck, and miraculously the loss of life was less than 10 people, while the economic impact was into the billions of dollars. And, I think, we can only venture a guess at what the damage and the loss would have been 20 or 30 years ago, before the advent of modern meteorology.

One of the principal inputs in modern weather forecasting involves computer models of the atmosphere, which solve a number of equations and give us a general picture of what the atmosphere in the Northern Hemisphere will be like 1 to 2 days in the future. It is really an analytical forecasting process which starts with as many accurate measurements as possible, measurements on the ground at individual weather stations, and measurements in the air by balloons and satellites. The larger and faster the computer models that we have, the more data and the more observations that can be handled; the more sophisticated the model can be, the faster we can get an answer for what the weather will be, and the more accurate I think our weather forecast can be.

Weather forecasting is really only as good as the observations of operational networks which support and develop the forecast product. And any cutback which means less information must mean some cut in service, perhaps some degradation in the accuracy and perhaps in some cases a significant and life-threatening loss of timeliness.

I use as an example closings of such stations as Flagstaff, Ariz.; Red Bluff, Calif.; Alamosa, Colo.; and Williamsport, Pa. All of these stations provide us with critical observations in those areas, but also all are important to that area for issuing warnings in their area.

Transfer of this responsibility, as is proposed in these cutbacks, to a more distant office, could in my opinion mean some delay in issuing, for instance, a flash flood warning or a tornado warning, the nearest forecaster being hundreds of miles away rather than right at that location. The local information, of necessity, has to be slower to reach him, and he can't respond as quickly as the local forecaster. He may not be as intimately familiar with the local area, may not have the network of spotters that are in that area.

There is just no substitute for the local forecaster who sees what is happening and can respond and issue a warning as quickly as possible. I just wonder how much we really save by completely closing 20 weather stations and risking a flood warning or a tornado warning being issued 5 or 10 minutes later than it could have been were there a local observer.

Surprisingly, one of the weak areas of forecasting, while we have made tremendous advances in being able to look at the large scale and accurately predict the large scale, is some of the events that occur over a short time, 30 minutes to 2 hours, features such as severe thunderstorms, the local heavy downpours that can cause flash floods, local strong winds, tornados which are too small to show on the scale of the computer models we use and yet which can be devastating locally.

Short-range tools like radar and small-scale observational networks have been used in research, but have not really kept pace with some of the operational developments that deal with the larger scale. This area, though, has given rise to opportunities. A powerful tool which is now being used in a number of research applications is the doppler radar. It is a radar which not only can detect rain, snow, and hail, but actually measure the movement, the velocity, of these particles within the clouds.

They have proven to be a very, very powerful research tool in being able to detect tornados forming within the cloud system some 10 to perhaps 20 minutes before the tornado appears and descends from the clouds. I think it is interesting that while the Government has not been able to fund an operational network of doppler radars and is now only using them in research applications, some private concerns have acquired this powerful tool.

There are now two television stations which have doppler radar, and one of them, KSTP in Minneapolis, has had a doppler radar in operation for 1 year. On one occasion, that I am aware of the TV meteorologist was able to identify a tornado signature, the tornado beginning to form in the cloud before it was visible, and give that information to the local weather service office and allow an early warning. Right now KSTP is in the process of providing a remote display of the doppler radar to the local weather service forecast office.

I mention all this because in my opinion the proposed cutbacks in Nexrad, the next generation radar, seem to me just to make no sense. We now have the technology to develop and implement the network of these doppler radars which will give some life-saving earlier warnings, and I just don't think that the cutbacks which would delay this Nexrad program are in anyone's best interest.

Other cutbacks proposed in the fire weather program seem to me to be also misplaced. These are dealing with, to a large extent, public lands, and while they involve a specialized forecast prepared by meteorologists who are specially trained in this area, I would venture to say that controlling one large forest fire, based on a specialized forecast with meteorologists in the field who are specially trained for that, would more than pay for the $800,000 savings by cutting the program.

The cuts in the fruit-frost program, I think, would be covered by private meteorologists. It seems to me that this is one area, that involves a very specialized forecast—dealing with the private sector, and if the forecasts really are of benefit, and I think they are, this segment of the agricultural community would be willing to pay private meteorologists for the specialized forecasts.

The agricultural weather program also, when I thought about it at first, seems to be a specialized forecast that perhaps would be better served by the private sector. However, considering those areas where the agricultural forecasts are of use, they are as much a part, of a public forecast for the Nation's farming areas as the zonal and city forecasts, that we have come to associate with the weather service, are in the urban areas. And in those areas where agricultural forecasts are issued, the general public is primarily engaged in farming or agriculture-related activities. And in this area, the issuance of the agricultural forecast certainly comes under, I think, the National Weather Service mandate of serving the general public.

Let me turn to, in this regard, my own thoughts on the private versus the public sector and the roles of the two. It is my feeling that the principal mandate of the Government meteorologist, the National Weather Service, is to serve the general public. The Government sector should be responsible, as it is now, for the issuance of State and zonal forecasts for the general public, all-weather advisories, watches, warnings, general extended outlooks of 5 to 90 days, seasonal recreational outlooks, and specialized information which comes from the National Satellite Service, Environmental Data and Information Service, National Ocean Survey, and so forth, of general usefulness to the public.

It is my feeling that the specialized and individualized forecasts for aviation, marine, municipal, and State governments, private business, and so forth are the provider of the private sector. We can cite many airline companies, local and State municipalities, transportation companies, utilities, which all employ the services of a private meteorologist or a private company. I don't think the Government should be in this business, which it is not by the way, in competition with the private sector.

It is interesting that as our ability to predict and understand the weather, and as the advance of our science has gone forward, so too, has the opportunity in the private sector. In my own area of broadcasting, in the past few years we have seen a dramatic increase in the number of meteorologists who are forecasting, using forecast information in broadcasting which I feel has been of tremendous benefit to the general public. They get more information, it is more timely, presented by people who know what they are doing, and the public has really come to understand, I think, meteorology as a science and has really seen the usefulness and the advances that we have made in this field over the past few years.

One of the problems, however, that we face in the private sector which is not faced in the Government sector is dealing with competency of our forecasters and people who are in the private sector. Right now there is nothing to prevent anyone from calling themself a meteorologist, gathering some weather data, and presenting forecasts.

We have within the American Meteorological Society, which is the meteorological scientific society, several programs which are designed to at least try to establish certain levels of competency for meteorologists, private meteorologists. Our certified consulting meteorologist program is quite successful, and in my own area, the society's radio and television seal of approval, seeks to establish certain minimum standards of competency so that we keep ourselves up to date. But I suggest, perhaps it might be time to consider some licensing of meteorologists, either on a State or local level, since we are increasingly dealing with private forecasts and private forecasters who are providing forecasts for the public.

Let me touch now on the basic question of fees, and the fee system, as it relates to weather services and weather information. I find the discussion of user fees for weather services interesting. Weather services and the weather forecast and the National Weather Service were also in the forefront of the changeover to the metric system, a changeover which, we all know, has not come. It is as though we were saying here is the one thing, the National Weather Service forecasts and forecast products are one of the most useful regular products that the Government provides and one of the most visible, they should be the first to feel the brunt of any new idea that comes along.

It is difficult to understand the rationale for charging for any public forecast issued by the Weather Service or any National Weather Service forecast product which is used by non-Government meteorologists in making public forecasts. I just can't imagine a newspaper or a radio or a television which is where the overwhelming majority of the general public get their weather information, being forced to pay a fee to then impart that information to the public which we are serving.

Any fee structure, it seems, which dealt with forecast information or data primarily geared to the public might as a consequence result in a decrease in the quality or in the quantity of data and information available to the public. And I just can't see this being in the public's best interest.

I know in my own field of broadcast meteorology right now there are a number of small television stations who have operated their weather departments, who have added a number of special services, who have hired meteorologists and are providing a definite useful public service to those areas they serve. And the imposition of fees on these smaller stations or smaller radio stations would, I think, of necessity mean a cutback in that service. So I just hope that the institution of user fees involving weather services and information primarily directed to the general public really is not seriously considered.

It is difficult, on the other hand, in theory to argue that the companies, the private companies whose principal business is providing specialized forecasts or weather information to the private sector and to private clients should not be charged some user fee for the data forecast products. However, while that is fine in theory I don't know that it would work in practice, because by and large these companies were very, very small companies whose annual gross business may be in the order of a few thousands of or hundreds of thousands of dollars. These are not multimillion-dollar companies, and the institution of fees for the weather data and products, it seems to me, would have serious detrimental effects on what is really a growing and beginning business.

These private companies have really only recently begun to grow and expand, and yet provide a very, very useful service to a wide segment of the economy.

In addition, I would venture to hazard a guess, that the fees that could accrue from any such fee structure with a small segment of our economy which really provides useful public service might just meet the administrative cost. To make it equitable we have to be literally talking about imposing fees on thousands of very, very small businesses, individuals, and the administrative cost of trying to do something like that seems to me to at best—maybe meet the income.

We then are looking at meteorology, which is a rather young science, and in my opinion has made tremendous advances in the past few decades. Given the complexity of the problem with which we are dealing, Government and private meteorologists do an amazingly good job of serving the public and the clients.

Any cutbacks mean, in the final analysis, less timely forecasts, less timely weather information, and perhaps less accurate forecasts. Cutbacks in our research efforts, satellite or radar programs will, at the least, mean that we stand still, and at worst, mean some deterioration in our ability to forecast the weather. And I think in summary, if we consider that if we are able to predict one more killer tornado 10 minutes earlier, or a hurricane 6 hours earlier, or a winter storm 10 hours earlier compared to what we could do 10 years ago, and we can now, that the savings in human and economic terms will exceed National Weather Service's proposed budget savings by hundreds and even thousands of times.

Again my thanks to the chairman and the subcommittee for the opportunity of presenting this statement.

[The prepared statement of Mr. Ryan follows:]

STATEMENT OF ROBERT T. RYAN

Thank you, Mr. Chairman. It is an honor and a pleasure for me to present this statement. It is rare that an individual has the opportunity to explain a bit of what his profession is, what benefits it bestows on those it serves, and how it could be so much better, if not all the proposed budget cuts are made. I should add, at this point, that while I am a meteorologist for WRC-TV, the NBC station here in Washington, the views I am presenting today are my own.

In considering the funding of our nation's weather services, I think it is helpful to reflect on the history of meteorology, and the task the meteorologist faces in trying to predict the weather.

HISTORY AND CHALLENGE OF FORECASTING

Meteorology is really a rather young science. An understanding of the physics and the processes going on in the atmosphere date from the early 1900's although observations of the weather have been made for hundreds of years before that. Interestingly, some of the Founding Fathers were avid weather watchers. Franklin was an experimenter in the atmospheric sciences; Washington kept weather observations at Mt. Vernon for years, as did Jefferson at Monticello. Jefferson purchased his first thermometer in Philadelphia while drafting the Declaration of Independence and made daily weather observations during that historic time.

With the advent of airplanes, the onset of the World Wars, and a resultant need to understand, explain and forecast our atmosphere, meteorology began to make significant advances. The advent of high speed computers, weather radar, and satellites coupled with a strong research effort which has led to an understanding of the physics of the atmosphere has brought us to the day of reliable analytical day-to-day weather forecasts.

Consider the problem the weather forcaster faces. Imagine a system, on a rotating sphere, which is 8000 miles across, consisting of different materials and different gases which have different properties (one of the most important of which, water, exists in different concentrations) heated by a nuclear reactor ninety-three million miles away. Then just to make life interesting, this sphere is oriented such that as it revolves around the nuclear reactor it is heated differently at different locations at different times of the year. Then someone is asked to watch the mixture of gases, a fluid only twenty miles deep (on this 8000 mile sphere), covering an area of two hundred million square miles and predict the state of that fluid at one point on the sphere two days from now. This is the problem weather forecasters face.

Something which deals with this complex system, seeks to understand it, observe it and predict it is a science. Modern weather forecasting is as much a science as physics, chemistry, biology, or astronomy. It is however, for better or worse, the one science which seeks to accurately predict the future state of an incredibly complex system. It is not an art, or a guessing game nor any more imperfect than any other science. Measurements are subject to error, subject to generalizations and some "rounding off" in trying to accurately describe this fluid twenty miles deep and two hundred million miles in area. Considering the magnitude of the problem of measuring the atmospheric system, describing it and predicting its future, modern weather forecasting is amazingly accurate and modern weather forecasters do an amazingly good job.

Reflect on the state-of-the-art in weather forecasting twenty years ago. The first crude satellite pictures were just becoming available, mathematical models of the atmosphere were only beginning to find an application, there were no colorized radar displays, the data communications network was much slower than now, and our skill in forecasting the weather was considerably below what it is now.

When one considers that about one thousand lives are lost directly or indirectly due to the weather or weather related events and the annual economic impact can run into the ten's of billions of dollars, it is obvious the value of reliable weather forecasts can not be underestimated. In September of 1979 hurricane Frederic slammed into the Mississippi coast with one hundred and twenty mile per hour winds, one of the most powerful storms to strike the Gulf Coast. Frederic had been followed by satellite and computer models for days; warnings and watches had been given days in advance, evacuations of hundreds of thousands had been completed. People were prepared. Less than ten lives were lost. What would have been the loss twenty or fifty years ago?

STATE-OF-THE-ART, NEEDS AND OPPORTUNITIES

As I mentioned meteorology and modern weather forecasting is a rather young science which like anything growing rapidly needs some nurturing to support its development and needs more support, not less. One of the principal inputs in modern weather forecasting, one to two days into the future, involves computer models of the atmosphere which solve a number of mathematical equations which describe the physics of the atmosphere. In a way, weather forecasting really involves seeking solutions to problems in fluid dynamics. The analytical forecasting process starts with as many accurate measurements as possible. The more measurements we have, the more accurately we can describe the current state of the atmosphere, and the larger and faster the computer, the more data can be handled, the more sophisticated the model can be and the faster the answer can be available and the more accurate the answer will be. I suppose on every forecaster's wish list would be bigger computers, more data from satellites which can get observations over oceans and remote areas where there are no weather stations, and more research on how best to integrate the increasing amount of data into the faster computers to yield more detailed computer models of our weather to help us provide more accurate and timely forecasts.

Weather forecasting can only be as good as the observational and operational networks which support and develop the forecast products. Any cut back which means less information, less data, fewer satellite observations, fewer observers, must mean some cut in service, perhaps some degradation in accuracy and in some cases perhaps a significant and life-threatening loss of timeliness.

Consider the proposed closings of such stations as Flagstaff, Arizona, Red Bluff, California, Alamosa, Colorado. All are responsible for issuing warnings in their areas. Transfer of this responsibility to more distant offices could mean some delay in issuing a flash flood warning, for instance. Because the nearest forecaster may be hundreds of miles away, information is slower to reach him and he can not respond as quickly as a local forecaster. There is no substitute for the local forecaster who sees what is happening and can respond and issue a warning as quickly as possible.

How much do we really save by completely closing twenty weather stations and risking a flood warning or tornado warning being issued five or ten minutes later than it could have been were there a local observer?

If we make twenty-five full-time weather stations part-time, we should tell nature that life threatening weather is now only allowed at those locations between eight o'clock AM and five PM, because there won't be anyone there at other times.

Surprisingly, one of the weak areas of forecasting now is the short range, i.e. thirty minutes to four hours. Small features in the atmosphere, thunderstorms, local heavy downpours, local strong winds, are too small in scale to show on computer models which are the powerful tools of the one to three-day forecasts. Short range tools like radar and small scale observation networks have not kept pace with some of our developments which deal with the large scale. This area of needs has also given rise to some opportunities. A powerful tool for short range forecasting is doppler radar. A radar which can detect rain, snow, hail and also measure the velocity of these particles in the clouds. Doppler radars have proven powerful research tools and have shown to be able to detect tornadoes forming within the cloud ten to twenty minutes before they appear and descend below the cloud. Interestingly, while the government has not been able to fund an operational network of doppler radars, some private concerns are acquiring this powerful tool. Television station KSTP in Minneapolis has had a doppler radar in operation for over one year and on one occasion was able to inform the weather service office of the development of an embryo tornado and allow an early warning. The proposed cutbacks in NEXRAD (next generation radar) seem to me to make no sense. We have the technology to develop and implement a network of doppler radars which will give life-saving earlier warnings. We should not delay the NEXRAD program.

OPPORTUNITIES IN THE PRIVATE SECTOR

The development and advancement of the science of meteorology has produced many opportunities in the private sector as the need for specialized forecasts has grown. Interestingly, in my own field of broadcast meteorology we are seeing more and more meteorologists rather than "weather announcers" and many broadcast facilities are now as well equiped as some National Weather Service Forecast offices. I think as the general public has felt that the reliability of day-to-day forecasts has increased, which it has, he has turned more and more to a professional, the meteorologist, as his source of weather information.

A problem for users of private forecasts is determining the competence of forecasters. There are no state, national or local licensing boards. In theory anyone can call himself a meteorologist and issue forecasts to anyone who will pay him. The forecasts issued by the National Weather Service to the general public are all prepared by competent, trained professional meteorologists. The professional and scientific society of meteorologists, the American Meteorological Society, has a Certified Consulting Meteorologist progran and in broadcasting we have the AMS Radio and TV Seal program but there are no licensing bodies as in other professions. Perhaps as our science has advanced in reliability, specialization, and sophistication it is time to consider licensing of meteorologists especially in those areas where issuing of forecasts directly impacts the public.

EFFECT OF PROPOSED BUDGET CUTS

I have discussed above the effect of proposed cuts resulting in the complete or partial closure of NWS weather stations. In my opinion the closings can only adversely affect the general public the NWS is trying to serve.

Proposed budget cuts in the fire weather program seem to me to also be misplaced. A specialized forecast prepared by meteorologists working from mobile units in the field can be of significant assistance to firefighters. I would venture to say controlling one large forest fire six hours earlier because of the input of a specialized forecast would more than pay for the eight-hundred thousand dollar savings by cutting the program.

The cuts in the fruit frost program, I think, would be covered by private meteorologists. It seems to me these are specialized forecasts dealing with the private sector, and if the forecasts really are of benefit, this segment of the agricultural community would willingly pay private meteorolgists for these specialized forecasts, as many private concerns do now in other fields.

At first glance it would appear that the NWS agricultural weather services are also specialized forecasts like the fruit frosts forecasts. However, I have come to believe that the NWS agricultural forecasts are as much a public forecast in the nation's farming areas as the zonal and city forecasts are in the urban areas. In those areas where agricultural forecasts are issued, the general public is primarily engaged in farming or agricultural related activities and in this area the issuance of agricultural forecasts certainly comes under the NWS mandate of serving the general public.

Moreover, I do not believe the average farmer could afford the services of a private meteorologist and if the agricultural program were cut he would be deprived of useful information and in the end the general public would be the loser.

USER FEES FOR WEATHER SERVICES

I find the discussion of user fees for weather services interesting. Weather forecasts and the NWS were also at the forefront of the changeover to the metric system, a changeover which has never come. It's as though we are saying, since the National Weather Service forecasts and forecast products are one of the most useful regular products of the government and one of the most visible, they should be the first to feel the brunt of any new idea that comes along. It is difficult for me to see any rationale for charging for any public forecast issued by the NWS or any NWS forecast product which is used by non-government meteorologists in making public forecasts. I can't imagine a newspaper, radio or TV station (where 98% of the public gets their forecast information) being forced to pay a fee to the government for that public forecast. Any fee structure which dealt with forecast information or data primarily geared for the general public might as a consequence result in a decrease of the quality and quantity of data and information available to the public and I can not see this being in the public's best interest. If a newspaper, radio or TV station has to pay a fee for forecasts or weather data they receive, they will probably decide to receive the bare minimum and I can not feel but what the average person would suffer because of a reduced timeliness and volume of weather information. I know of many small radio and TV stations who employ competent meteorologists who provide timely, accurate weather information of tremendous public service. If fees were imposed these services would be cut back and the general public would be the loser. I hope that institution of user fees involving weather services and information primarily directed to the general public is not seriously considered.

On the other hand it is difficult to argue that in theory companies whose principal business is in providing specialized forecasts or weather information to the private sector and private clients for profit should not be charged some user fee for the data and forecast products which are now essentially free.

However what might sound fine in theory might do more harm than good in practice. By and large the private meteorological companies do a business volume of anywhere from several thousand to several hundred thousand dollars per year. There may be several companies whose annual gross business is one to three million dollars but by and large the private meteorologist is a very small businessman. Institution of fees for weather data and products provided by the NWS would have a serious detrimental effect on a number of small businesses which have only recently begun to grow and expand and yet which do provide very useful services to a wide segment of the economy.

If fees were imposed, the private meteorologist who provides specialized service for businesses, state, and local governments, agriculture, would be forced to raise his own fees, probably lose business as a result and many segments of society now indirectly served by the private meteorologist would be hurt. As a practical matter the institution of fees for weather services will not be a significant source of income for the government and can only hurt a small yet very beneficial segment of private enterprise. I cannot believe that's what we want to do.

In addition, I would estimate, that the income from any fee system would probably at best only balance administrative costs needed to oversee any fee system which, to be equitable, would have to be imposed on hundreds of very small companies.

THE ROLE OF THE GOVERNMENT AND PRIVATE WEATHER SERVICES

I touched briefly on the role of the government and the private meteorologists above. My feeling is that the principal mandate of the government meteorologist is to serve the general public.

The government sector should be responsible for issuance of state and zonal forecasts for the general public, all weather advisories, watches, warnings, general extended outlooks of five days to ninety days, seasonal recreational outlooks and specialized information from NESS, EDIS NOS, etc, of usefulness to the general public.

It is my feeling that specialized and individualized forecasts for aviation, marine, municipal and state governments, private business, are the province of the private sector. Many airlines have their own meteorological staffs to support their operations, local municipalities, trucking companies, utilities, seasonal industries, etc., all employ the services of the private meteorological sector to meet their special needs and requirements. I do not think the government should be in this business, which it is not, in competition with the private sector.

SUMMARY

Modern meteorology is a rather young science which has seen tremendous advances in the past few decades. Given the complexity of the problem they are dealing with the government, and private meteorologists do an amazing job of serving the public and their clients. Any cutbacks which mean less data mean less timely forecasts, less timely weather information, and perhaps less accurate forecasts. With the tremendous advances which have been made in understanding the atmosphere, observing and predicting its behaviour, now is not the time to cut back our efforts. Cutbacks in our research efforts, satellite or radar programs will, at the least, mean we stand still and at the worst mean some deterioration in our ability to forecast the weather. If we are able to accurately predict one more killer tornado or give six hours more warning before a massive hurricane strikes or twelve hours warning before a paralyzing winter storm, the economic and human savings will surpass any budgetary savings by hundreds perhaps even thousands of times.

Meteorologists, both public and private, are a group of dedicated thoroughly professional scientists who provide enormous and often unappreciated and unrecognized service to our country but a group of dedicated scientists who could also do even better with more rather than less support.

Once again, my thanks to the Chairman and the Subcommittee for the opportunity of presenting this statement.

Mr. **Brown**. Thank you, Mr. Ryan, for a very eloquent statement. Mr. Carney, do you have any questions?

Mr. **Carney**. Yes; thank you, Mr. Chairman. It was very informative.

Does WRC do the weather forecast as a public service, or is it done on commercial time?

Mr. **Ryan**. It is a commercial news station, and it is part of our mandate, I think, to provide public information and keep the public informed we provide weather forecasts.

Mr. **Carney**. Would you suggest that during the WRC news if the Nielsen ratings were affected differently, negatively instead of positively from good weather forecasting, they probably would drop them?

Mr. **Ryan**. I doubt it.

Mr. **Carney**. Why would you say that?

Mr. **Ryan**. It is interesting that the American Meteorological Society, a number of years ago, has done a survey, and in those instances where weather information was presented by a meteorologist in a broad survey of the country, those stations which have professional meteorologists and happen to have professional presentations are also the leaders in their local community.

Mr. **Carney**. The point is that the weather service is something that is very sought after. You are in a competitive market——

Mr. **Ryan**. That is right.

Mr. **Carney** [continuing]. With other television stations. And this is something that the management of your station looks at very carefully or they wouldn't have hired someone as qualified as you, not only to predict the weather but to give it to the public in the fashion that they do, because it affects them positively. And it is part of your Nielsen ratings, part of your profit structure, to have this.

That is where I have a little problem with the fee structure. We went through the whole thing about how important it was and how it was a service, but we forgot to say that WRC is concerned with ratings and concerned with profit. The one thing that people want from them more than any other thing on the news, with perhaps the exception of sports, is weather service. I am not sure but I am just assuming that. I am sure that those ratings are important to how you sell your time. Would I be far from wrong to say that your news program is probably in the upper 50 percent of your time as far as cost to an advertiser?

Mr. **Ryan**. Not having any background with the sales or sales department, I am really not qualified to talk on that. I would say—my own observation is that we are providing the public with information, and every survey that I have seen indicates that the primary source of their weather information is radio or television or a newspaper.

Mr. **Carney**. I don't have any disagreement with you on that, Mr. Ryan. I simply say your program is one of the key elements to attract viewers, and that is very important to how much you can charge for commercials. The weather service has a great commercial impact. You are constantly reevaluating your news broadcasting, and you are constantly reevaluating the aspect of weather forecasting and broadcasting. Because of the fact that probably the slickest sportscaster and the best weather service is going to capture that 6 to 7 viewership of that station, it has a great commercial value to you. You are not really doing it as a public service. You are doing it to make a profit.

Based on that, I can't see why we couldn't, as a service, sell that service to WRC.

Mr. RYAN. It's perhaps a difference just in philosophy, in that if indeed we accept that the radio and television or the mass communication media that we have now is the principal source of weather information, and that it seems to me one of the principal mandates of the government is to provide for the safety of the citizenry, and when we are dealing with weather, which can be at times life-threatening, it hardly seems in anyone's best interest to say that here is a hurricane, and we have the tools and we have the equipment to accurately predict it, but we have to await the fee that you're about to pay us before we're going to tell you exactly where it's going.

And anything that jeopardizes that or not only in WRC and not only in a major market station, but as I mentioned, in some smaller stations, there may be a temptation to cut back on the services that they are providing if indeed the fee structure is such that they feel well, let's try and shave a little bit here, let's try and save a little bit there.

It's not as though the resources were unlimited, and again it is something that while we are obviously in the business for profit, it is important information. And——

Mr. CARNEY. I would like to say that during all the fuss over the profits of the oil companies, one of the major networks made a greater profit than the oil company. But that's beside the point. We've closed down 45 part-time weather stations in the fiscal 1982 budget. Are you familiar with any of them? Do you know if that had any effect on the communications industry's ability to provide weather services properly, in a timely fashion, in those areas?

Mr. RYAN. I cannot cite a specific case, since it has only been—that was fairly recent, and I think to speculate in the future—at some point, and given the variability of the weather, at some point there will come a situation and there will come a time where either because of a cutback, in my opinion, of a full-time weather station to a part-time weather station, or complete closing of a weather station, that some significant life-threatening weather event will occur in that area.

It could have been more accurately forecasted and given in a more timely fashion had the weather station not closed.

Mr. CARNEY. Would it be fair to say that the state of the art might be at a point where you could cover a greater area with more accuracy with less stations?

Mr. RYAN. I wouldn't want to speculate on that. I don't—I think we have our—the state of the art has come to such a point that we can foresee some of these life-threatening situations coming. But again I think there is no substitute for the local observer and for the local forecaster who is on the scene, and can respond very, very quickly when a small event may be taking place, such as a flash flood, a particular creek that may be in danger of overflowing. There is just no substitute for that unless we want to create a system and a network of very, very detailed automatic stations, which in the long run may be even more costly than maintaining the operational network that we have now.

Mr. **Carney**. Can you briefly tell me what you do in your day's work as far as to determine your forecast at 6? That is, what are the sources that you would be using?

Mr. **Ryan**. Now we have a direct line with the National Earth Satellite Service, so we are continuously receiving satellite pictures from both the GOES satellite in the East and West, at the discretion of whatever particular pictures are important at that date, we have a direct tie-in with the National Meteorological Center facsimile network so we are continuously receiving all the output, the guidance products, the maps, and so forth. We have through a private company a direct tie-in to the National Meteorological Center computer, so that we are continuously receiving all the raw data and also some of the outputs from these computer models.

And we have a drop from the National Weather Service radar at Patuxent River, Md. So in essence I have all the tools there and all the information that I need to function as a meteorologist in preparing my own weather presentation and weather forecast. In addition, we have established a network of volunteer observers which are now almost 200 in number in our viewing area, which allows us, I think, to get particular detail in the case of severe weather or in the case of any life-threatening weather. So by forming our own network, we have really even gotten a closer, finer detail and are able to hopefully provide greater public service than we could with just one or two inputs.

Mr. **Carney**. What kind of data service do you provide to your listening audience?

Mr. **Ryan**. Well, on radio we do it six times, in the morning and then numerous times during the afternoon and evening, and on television three times during the 5:30 and 7 o'clock news and once during the 11 o'clock news. And at my own option also, in cases of severe winter storms we have interrupted as needed to keep people informed of the situation as it developed.

Mr. **Carney**. Do you have 24-hour meteorologists on hand, or is it basically yourself?

Mr. **Ryan**. It is basically myself who is capable of operating at 24 hours as the need presents.

Mr. **Brown**. Mr. Carney, I don't want to interrupt further questions, but I am trying to reserve a little time.

Mr. **Carney**. I understand, Mr. Chairman. I had one further question I wanted to ask.

How long have you been with the station, let me ask?

Mr. **Ryan**. Almost 2 years.

Mr. **Carney**. Could you provide for this committee without too much strain the amount of time in that 2 years time period you provided services other than the scheduled dinnertime news broadcast and 11?

Mr. **Ryan**. Well, one example that comes immediately to mind was last year there was a tornado which touched down on Clifton. The Weather Service forecast office issued a tornado warning. We have a remote camera in the newsroom which I can go to at any time, call up the master control and say let's go on the air. We interrupted the program to give the tornado warning. We had a radar display up so that the viewers could see exactly what was happening at that time and I could explain it, and then as the situation developed and as the storm diminished we were interrupted—this was between about 8 and 10—several times, to inform the people of the progress of that storm and how the warnings had been extended or diminished.

Mr. **Carney**. That's precisely what I am looking for. Could you provide it to the committee? How frequently you have done that in 2 years? You know, track the particular problem, a severe weather problem, off of your normally scheduled weather forecast?

Mr. **Ryan**. Yes.

Mr. **Carney**. Thank you.

Thank you, Mr. Chairman.

Mr. **Brown**. Thank you very much, Mr. Ryan. I have no further questions, but if there were time I would want to go into some of the educational aspects of your work. This committee is very concerned with some of these educational aspects. We are very concerned with cutbacks in the field of science education and the decreasing level of technical literacy in the public. You may be the only remaining way of getting that kind of education to the public.

Mr. **Ryan**. Well, we have our new 1982 guide and almanac, and I would be happy to leave several copies.

Mr. **Brown**. Thank you very much.

Our next witness is another distinguished television meteorologist, Mr. John Coleman. If he would come up at this point.

We look forward to your testimony, Mr. Coleman. We know that your contribution will be very useful to us.

STATEMENT OF JOHN COLEMAN, "GOOD MORNING AMERICA" SHOW

Mr. **Coleman**. Thank you very much. Good morning to the members of the committee and staff.

The importance with which I regard this opportunity can be easily illustrated in that I chose today to make a performance before an ever-increasing crowd—thank goodness, perhaps—a crowd of up to ten as opposed to appearing before 15 million. I took the day off from "Good Morning America" to be certain that I could be here on time to have my hearing. I came because I am vitally interested, as I have been throughout my 28-year professional career on television and in meteorology, in the National Weather Service. I regard it as possibly the best-run bureau of the National Government, the most efficient and the most dedicated.

There is an old saying that the squeaking wheel gets the grease, and as I look around this room I, like you, a fan of manned space, know that that is the glamor boy of science. I have supported it. I continue to support it. I have chaired it as you have, but the workaday world of science that contributes to the basic quality of American life is the job of the National Weather Service and a job that I think has been done very well.

I have just hired a staff of 52 meteorologists for a new enterprise I am undertaking—and I will discuss that more in 1 minute—but in the process I have résumés from dozens of National Weather

Service meteorologists interested in employment in the nongovernment field. Their morale is broken. Their spirit is crushed. Their feeling is that there is no support and no appreciation for the very basic work that they undertake, and further budget cuts and further elimination of stations will further deteriorate that situation if for no other reason than to keep the morale of these important scientists at an acceptable professional level. I would urge you to reconsider any cuts of the National Weather Service. I cannot resist the temptation—after all I have been doing it for 28 years—to give you a little weather report this morning. I do not wish that any member of the committee were spending his morning at Sheridan, Wyo., where there is a 300-foot broken cloud, a 700-foot overcast, and only 2 miles visibility, with 30° and freezing drizzle producing ice on the roads and trees and sidewalks, but you might enjoy being in Havre, Mont., where it is 14° and a gentle snow is falling, and I am sure that you would enjoy being in Kahului, Hawaii, where the report is that there are just a few scattered and very high thin broken clouds this morning and the temperature is 68°. Or, if you were spending the day skiing, Alamosa, Colo., reported 20° this morning—that is one of the two mountain stations that report through the night in Colorado—and all of the stations of course I have mentioned in this brief weather report are stations that we are considering closing according to the plans of these budget cuts.

In my 7 years on "Good Morning America" I have night after night—yes, we get up very early for that program—sat beside my meteorological colleagues in the ABC weather office and searched through our computer for reports of weather conditions and spots across the country. We use that to compare to the guidance that the computer gives us in producing our forecast. Sometimes, we will find errors in the computer guidance in speed or intensity, in the moisture content of the storm, in the thermal balance of the storm, and these help us to alter the forecast for areas downstream weatherwise from the points we observe. Every one of the weather stations that are proposed to be cut are weather stations whose observations I have looked at through that entire period and on which I rely. In the average morning on "Good Morning America" on my telecast I say the names of at least 60 American towns. These towns are among them. They are the towns where weather reporting stations exist. So what good is that beyond the good of the people to those towns?

Well, as my mail indicates to me, one of the worthwhile functions that I have served besides providing meteorological information, is creating a sense of America. With television so centered in Washington and in New York and in Hollywood, great reaches of the Nation rarely get mentioned or covered. Who else on television besides me is going to mention Dubuque, Iowa? Who else—Red Bluff, Calif.? And isn't it well you, ladies and gentlemen, remember those communities, and isn't it well that people in those communities have some notion of what is happening in Key West and that the people in Rochester, N.Y., or Buffalo, when suffering from a late snow, know something of the ice storms that fall regularly over northern Missouri and southern Iowa and can compare their plight to that of frequently drought-ridden areas of southern California.

It is difficult to measure those things, but I mention them to you. In my prepared testimony I have dealt with the relationship between the National Weather Service and the private sector. As you of course know, the Weather Service is mandated to provide warnings of significant meteorological events that threaten life and property and routine weather forecasts—the best of scientific ability on a day-to-day basis—that affect the lives of every man, woman, and child in the Nation. I am sure that you are cognizant of the fact that the work of the National Weather Service is probably the sole Federal effort that touches the life of every citizen. We do not all pay taxes. Some manage to escape, I am told.

The basic scientific undertaking that is required to fulfill this mission by the National Weather Service to make the atmospheric measurements and to collect the data is on a scope that is so broad as to be quite beyond the proper role of any nongovernment organization. It is obvious that these efforts extend across the boundaries of the States, a little less obvious that they of course are a worldwide operation requiring a constant exchange of data with every significant nation in the world regardless of political orientation. If the act is as basic as reading a thermometer, as sophisticated as collecting satellite data, then the work that must be done must be done with diligence and with scientific control. It requires disciplines and consistencies that are really quite beyond the philosophical grasp of any commercial enterprise, even if it were as large far-flung as General Motors or A.T. & T.

The cost of collecting and processing this information is greater than could be borne by all of the companies engaged in meteorological enterprise in the Nation. I make that observation, not as the casual remark of a glamour boy TV weatherman. They are a professional considered conclusion of a businessman meteorologist.

Currently, in addition to my visible role as weathercaster on ABC's "Good Morning America," I serve as president of two meteorological media concerns. The first, Broadcast Weather Enterprises, provides the entire meteorological and weather production for "Good Morning America" and also provides services to ABC news in addition to providing my services as the young camera beauty boy. The second is far more significant. That is a company known as the Weather Channel Inc. The Weather Channel is a new subsidiary of Landmark Communications representing an investment of tens of millions of dollars which on May 2 of this year will begin to become a national satellite cable television network devoted totally to providing timely and accurate weather forecast and reports on a continuous live channel to be used on cable systems from coast to coast.

The Weather Channel, to explain the enterprise so that anyone in the room might understand it, will be to weather what cable news network or CNN is to news. The Weather Channel would be neither technically nor economically feasible without the data base, the sophisticated computer model atmospheric guidance, constantly updated local forecast for more than 620 weather zones covering the entire Nation, and the locally produced weather warnings issued by the National Weather Service.

Now, we are very proud that we are becoming the direct communications link to deliver these warnings and forecast products exactly as they are written by the National Weather Service meteorologist to the television homes to which they are intended on a virtually instantaneous automatic basis. This is the first time any system has been devised to provide this direct communication link.

This would not be possible, however, on a user's fee basis. I have found no way to charge the general public for its basic weather information. It is not possible either on a per subscriber payment scheme by the Nation's cable systems—I took a close look at that and had to drop it—or by any other straightforward scheme that I had to concoct. Instead the Weather Channel will be totally supported by advertising revenues. These revenues and the undeveloped advertising medium of cable television will be very slow to develop.

In order to package the weather reports in a network quality way and personal and human manner, which is necessary to attract the advertising and to operate the space-age television and meteorological facility which we are putting together, and to transmit the entire package, including the NWS forecasting and warnings to cable systems throughout the nation has required a budget in excess of $1 million a month.

Our most optimistic projections will not produce a profit for this venture until its third year of operation, much less any quick return on the capital investment required. Any significant user's fees for the NWS materials required to operate the Weather Channel would actually make it impossible to develop a viable rate of return from the advertising revenue projections and this new cable network actually would not have been founded.

I quote a couple of statistics, if I may, to illustrate the importance of the Weather Channel to the NWS in fulfilling its congressionally mandated mission. An NWS study in June of 1980 indicated 53 percent of the people of the United States state that television is their primary source for weather information. An A. C. Nielsen market study funded by my company revealed that in cable TV homes 77 percent of those queried indicated television was their primary source of weather information. It therefore appears that as the vast majority of American homes are wired for cable television in this decade, television will become even more the dominant source of weather information for the public.

A little aside item—my first TV weather report was in 1954. At that time the average American over-the-air television station devoted 20 minutes to weather coverage in its 24-hour day. In 1981, the average over-the-air television station provided weather reports 18 minutes a day. Therefore, it follows that providing weather information on a 24-hour-per-day basis on the Weather Channel, all other considerations as quality of information and quality of presentation being equal, the Weather Channel will clearly become the Nation's No. 1 source of public weather information. It is clear that the Weather Channel will provide a real benefit to the American people and to the National Weather Service.

How many lives will be saved? How much property damage and trauma will be avoided because the Weather Channel will disseminate on a live and continuous medium, current weather warnings, and forecasts? The Weather Channel is greatly assisting the National Weather Service in meeting its goal. We are providing this significant benefit and we do not seek to be reimbursed by the National Weather Service for doing it, because historically, there has been no financial connection between the National Weather Service and the communications outlet that distributes the weather information to the public.

I think it is perfectly appropriate that the National Weather Service does not have the means to publicly disseminate its information. Communications outlets have that means. They complete the process of informing the public on behalf of NWS. If dissemination of this information were drastically through the implementation of user's fees, one wonders if that would be in the best interest of the American people. We are dealing here in an area of public safety and I know that no one wants to jeopardize public safety. If lives were lost because of reduced availability of weather information, would user's fees be worth it? Certainly communication outlets informing the public should not be charged the user's fee to be a conduit of weather information. Such use is clearly justified by significant public purpose.

Those private meteorological concerns that produce specialized weather reports and forecast to serve specialized industrial and agricultural needs might be able to pay limited user's fees, but, from my position as a close observer of that area of enterprise, in truth the economic potential there is very limited as well. The weather business is, in fact, a very small business. Compared to almost any other area of economic endeavor in the Nation, we are miniscule. There are only five companies that produce meteorological radar units and display equipment for general use. There are only two companies that provide data base computer services on a wide scale. There are only three companies that supply facsimile recorders to receive weather maps and satellite pictures and all of these companies are very small or are varied divisions that serve the meteorological community, tiny parts of larger companies.

Television and radio regard weather as significant information content, but they make minimal financial outlays to support these operations. In the average television station, the news department of 20–25 people and a $1 million budget will be offset by one or two people in the weather operation, usually an adjunct to the news department, and a budget other than salaries of maybe about $20,000 a year.

The "Good Morning America" weather operation, which I head, is the largest budgeted network weather telecast in the Nation, but other than salaries, it only represents a commitment of about $125,000 a year.

So, in summation, my judgment is that a significant change in the relationship between the NWS and its media users is not practical and is not in the public interest either.

On the other side of the ledger, the cutbacks at the National Weather Service that have occurred in the last few years have reduced the effectiveness of NWS. Meteorologists who had planned careers in Government service have become disillusioned, even alarmed, as staff and facilities shrink. Dedication and morale are badly damaged.

Observational cutbacks are reflected in less accurate warnings and forecasts. Budget trimming in atmospheric research further decays morale and thwarts any progress in a better understanding of atmospheric processes, and consequently eliminates the chance of any improved forecasts.

As a citizen I strongly support the efforts of the current administration and this Congress to exercise strong fiscal restraint and to reverse the severe economic trends of recent years. I am as alarmed as any one in this room. In my considered professional judgment, to accomplish this by taking money from the National Weather Service budget is a regressive approach to the problem, one that is not in the public interest, one that would probably jeopardize public safety. An effort to counterbalance these cuts by attempting to harvest user's fees from the meager private meteorological fraternity will fail or be of truly little consequence.

I thank you for this opportunity to speak before your subcommittee. It is an honor to have a hearing.

[The prepared statement of Mr. Coleman follows:]

TESTIMONY OF JOHN COLEMAN

The National Weather Service is mandated by an act of Congress to provide warnings of significant meteorological events that are a threat to the life and property of the people of this nation, and to predict, to the best of scientific ability, the day to day weather that will affect the lives of every man, woman and child in this nation. The work of the National Weather Service is the sole federal effort that I know of that touches the lives of every citizen.

The basic scientific undertaking that is required to fulfill its mission requires the National Weather Service to make atmospheric measurements and collect data on a scope that is so broad that it is quite beyond the proper role of any non-government organization. It is obvious that its efforts extend across the boundaries of all 50 states, and only slightly less obvious that this role of measuring the atmosphere and collecting meteorological data is a world wide operation requiring a constant exchange with every significant nation of the world regardless of political orientations. From an act as basic as reading a thermometer to one as sophisticated as collecting observations via meteorological satellites, this work must be done with diligence and scientific control that requires disciplines and consistencies which are far beyond the philosophical grasp of any commercial enterprise, even if it were as large and far flung as General Motors or AT&T. The costs of collecting and processing this information is greater than could be borne by all the companies engaged in meteorological enterprises in this nation.

These observations are not the casual remarks of a glamour boy, TV-Weatherman. They are the professional, considered conclusions of a businessman-meteorologist who has spent his entire professional career in this field. Currently, in addition to my very visible role as Weathercaster on the ABC television program, "Good Morning, America", I serve as President of two meteorological-media concerns. The first, Broadcast Weather Enterprises, provides the entire meteorological and weather production for "Good Morning, America" and also provides services to ABC News, in addition to providing my services as on-camera weathercaster. The second is far more significant: A company known as "The Weather Channel, Inc."

The Weather Channel is a new subsidiary of Landmark Communications, Incorporated, representing an investment of tens of millions of dollars. On May 2nd of this year, The Weather Channel will become a national, satellite cable network devoted totally to providing timely and accurate weather forecasts and reports on a continuous, live television channel to be seen on cable systems from coast to coast. The Weather Channel to explain the enterprise in an understandable manner, will be to weather what cable news network or CNN is to news. The Weather Channel would be neither technically nor economically feasible without the basic data, sophisticated computer model atmospheric guidance, the constantly updated local forecasts for more than 620 weather zones covering the entire nation, and the locally produced weather warnings issued by the National Weather Service. We are proud that we will become the first direct communications link to deliver these warnings and forecast products exactly as they are written by National Weather Service meteorologists to the television homes for which they are intended on a virtually instantaneous, automatic basis. This is the first time any system has been devised to provide this direct communication link. This would not be possible, however, on a direct user-charge basis, on a per subscriber payment scheme via the nation's cable systems, or via any other straightforward system which I could concoct. Instead, The Weather Channel will be totally supported by advertising revenues. And, these revenues in the undeveloped advertising medium of cable television will be very slow to develop. In order to package the weather reports in the network quality, personal and human manner necessary to attract such advertising, and to operate the space-age television and satellite communications facility necessary to transmit the entire package including the NWS forecasts and warnings to cable system affiliates throughout the nation has required a budget in excess of a million dollars a month. Our most optimistic projections will not produce a profit from this venture until the third year of operation, much less a quick return on the capital investment required. Any significant users fees for the NWS materials required to operate The Weather Channel would have made it impossible to develop a viable rate of return from the advertising revenue projections and this new cable network would not have been founded.

May I quote some statistics, please, to illustrate the importance of The Weather Channel to the NWS in fulfilling its congressionally mandated mission. An NWS study in June of 1980 indicated that 53% of the people of the U.S. state that television is their primary source of weather information. An A. C. Nielsen cable market study funded by my company, revealed that in cable-T.V. homes, 77% of those queried indicated television was their primary source of weather information. It therefore appears that as the vast majority of American homes are wired for cable television in this decade, television will become even more the dominant source of weather information for the public.

I did my first T.V. weather report in 1954. At that time, the average American over-the-air television station provided about 20 minutes of weather coverage during the 24-hour day. In 1981, the average over-the-air television station provides weather reports for about 18 minutes per day. It follows, therefore, that by providing weather information on a 24-hour per day basis on The Weather Channel, all other considerations such as quality of information and quality of presentation being equal, The Weather Channel should clearly become the nation's number one source for public weather information.

It is clear that The Weather Channel will provide a real benefit to the American people and to the National Weather Service. How many lives will be saved? How much property damage and trauma will be avoided because The Weather Channel will disseminate on a live and continuous medium, current weather warnings and forecasts. The Weather Channel is greatly assisting the National Weather Service in meeting its goal. Although we are providing this significant benefit, we do not seek to be reimbursed by the National Weather Service.

Historically there has been no financial connection between the National Weather Service and those communication outlets that distribute weather information to the public. This is perfectly appropriate. The

National Weather Service does not have the means to publicly disseminate its information. Communication outlets do have the means. They complete the process of informing the public on behalf of the National Weather Service. If dissemination of this information was drastically reduced through the implementation of user charges, one wonders if that would be in the best interest of the American people. We are dealing here in the area of public safety and I know no one wants to jeopardize public safety. If lives were lost because of reduced availability of weather information, would user fees be worth it? Certainly, communication outlets informing the public should not be charged a users fee to be a conduit of weather information. Such use is clearly justified by a significant public purpose.

Those private meteorological concerns that produce specialized weather reports and forecasts to serve specialized industrial and agricultural needs might be able to pay a limited users' fee, but from my position as a close observer of that area of enterprise, the economic potential of that area is limited as well.

The weather business is, in fact, a very small business. Compared to almost any other area of economic endeavor in this nation, we are miniscule. There are only five companies that produce meteorological radar units and display equipment for general use. There are only two companies that provide meteorological data base computer services on a wide scale. There are only three companies that supply facsimile recorders to receive weather maps and satellite pictures. All of these companies are either very small or the divisions that serve the meteorological community are tiny parts of the larger company. Television and radio regard weather as significant information content, but make minimal financial outlays to support those operations. In the average television station, a news department of 20 to 25 people and a million dollar budget will be offset by a 1 or 2 person weather operation (usually as an adjunct to the news department) and a budget (other than salaries) of $20,000.00 per year.

The Good Morning America weather operation is the largest budget network weather telecast in the nation but other than salaries represents a commitment to meteorological information of only $125,000.00 per year.

In summation, my judgement is that a significant change in the relationship between the National Weather Service and its media users, at least, is not practical or in the public interest.

On the other side of the ledger, the cutbacks in the National Weather Service that have occurred in the last several years have sharply reduced the effectiveness of the NWS, in my view. Meteorologists who have planned careers within the government service have become disillusioned and even alarmed as the staff and facilities shrink. Dedication and morale are badly damaged.

Observational cutbacks are reflected in less accurate warnings and forecasts. Budget trimming in atmospheric research further decays morale and thwarts any progress in a better understanding of atmospheric processes and consequently eliminates the chance of improved forecasts.

There is an enormous inefficiency in the federal meteorological undertaking. Each branch of the military has established and maintained its own weather bureau. Each maintains an extensive computer atmospheric model capability and electronic communications facility. Each trains and maintains an independent forecast group. While the military basic observations are available to the civilian contingent and vice versa, the products of the military communications computer systems and atmospheric models are not regularly utilized in the private sector. The mission of each of these meteorological organizations is somewhat different such as an emphasis in ocean surface forecasts in the Navy, and in flight weather for the Air Force. However, much of the data gathering and processing, analysis and atmospheric modeling is essentially identical. Of course, national defense needs require some redundancy but, in fact, there is no regard for unnecessary duplication. To trim back the National Weather Service budget while maintaining or expanding the budgets of the military branches and their meteorological capabilities is frustrating to say the least and inefficient and wasteful in my harshest judgement. I firmly believe that a shifting of overall meteorological responsibility for the general gathering of data, its analysis and dissemination to the National Weather Service would make sense. The necessary special forecasts needed by the various military branches could be generated by each branch and thus produce considerable overall savings, a unified national meteorological effort, a far superior service to the general public and accomplish one of the goals of all of us: A smaller federal budget and deficit.

As a citizen I strongly support the efforts of the current administration and Congress to exercise strong fiscal restraint and to reverse the serious economic trends of recent years. In my considered professional judgement, to accomplish this by taking money from the National Weather Service budget is a regressive approach to the problem; one that is not in the public interest; one that would probably jeopardize the public safety. An effort to counterbalance these cuts by attempting to harvest users fees from the meager private meteorological fraternity will fail or be of little consequence.

Thank you for this opportunity to speak before your subcommittee. It is an honor to be given this hearing.

Mr. BROWN. Mr. Coleman, I just want to address one question briefly. I think you comment in your prepared statement on the possibilities of some consolidation of the effort now being expended in the Defense Department to create some of the economies that are sought by these cuts in the Weather Service. Would you care to venture a guess—I doubt that we can do anything more than that—as to the potential savings that might occur if we could get the Defense Department to rely more heavily upon the meteorological work done by the Weather Service?

Mr. COLEMAN. You are speaking to a man with little knowledge who would not want to make a great pretense. I have been exposed in presentations of professional meetings of the American Meteorological Society and the National Weather Association to presentations of the meteorological facilities and capabilities of both the Navy and the Air Force. They were impressive.

On the other hand, I have not personally visited those facilities. I am not aware of their budgets. I do not know of their staffing. I also know that within the military there is a requirement that personnel be rotated and you have a strong problem with consistency of product based upon the lack of consistency of professional personnel in those facilities. So, I would not want to judge the product either.

I suspect frankly that my imagined savings when I was dictating my prepared statement were probably greater than any that would actually take place should the hard look be taken.

Mr. BROWN. Well, we probably can get that information directly from the Weather Service.

Mr. COLEMAN. Congressman, may I say one more thing?

Mr. BROWN. Yes.

Mr. COLEMAN. I do note that in the current administration at the National Weather Service there is a strong move toward a very strong cooperation between the military and the National Weather

Service as evidenced by Dr. Joe Friday's presence as Deputy Director.

Mr. BROWN. I note that the budget we are currently considering does provide for the transfer of some of the costs for aviation service to the Federal Aviation Administration to be paid for through the user's fees on aviation. I see nothing wrong with that personally. I see nothing wrong with a similar approach to some of the needs of the military services, particularly if it would not affect the carrying out of their mission and if it would produce some savings. In principle, charging the military would not be much different than trying to charge the public for some of these services. If it is good for one, it ought to be good for the other and it might enable us to make some savings while protecting the high-level service that currently exists in the Weather Service. I hope that the committee will explore that further. I have no further questions.

Mr. SCHEUER. I only have one question please, Mr. Coleman. You have contended that the recent cutbacks have affected morale and effectiveness in the National Weather Service, have produced less accurate warnings and forecasts, and have thwarted progress that could have been made in improving our understanding of atmospheric processes. Can you give us examples of these things that you have alleged?

Mr. COLEMAN. In the mountains of Colorado we now only have two weather service offices that provide reports through the nighttime hours. There have been several occasions in the past winter where neither of those offices has been in the heart of a developing storm system and I have called the National Weather Service offices that are manned in, for instance, Denver, Cheyenne and Salt Lake and have said, "What's going on up in the mountains?" They said we cannot really tell you because we do not have any information from there either at the moment. We rather think that the storm is a little more intense and that maybe some winter storm warnings are appropriate, but we cannot really get a good handle on it until people begin to come to work in the morning. So, I have gone on "Good Morning America" on national television without being able to clearly say whether travel should be attempted that day between Denver and Salt Lake City through the mountains. That is one example.

Mr. SCHEUER. Congressman Carney.

Mr. CARNEY. Thank you very much, Mr. Chairman. Mr. Coleman, I would like to thank you for a most interesting testimony. I would say you were fearful of being presumptuous about trying to associate the expenses that could be saved with the military. I admire the fact that you were not when you considered yourself a glamour boy. It is the consensus up here that the glamour boy was the first witness, but you have the melodious voice.

Mr. COLEMAN. I agree with you. [Laughter.]

Mr. CARNEY. On this area where you hired—and you said that you hired—now, I was not clear——

Mr. COLEMAN. My company, the Weather Channel Inc.

Mr. CARNEY. The Weather Channel—that is your company, and you are——

Mr. Coleman. I am the president and chairman of the board. The company is a partnership between myself and Landmark Communications.

Mr. Carney. All right. Thank you. That was not clear to me. Weather Channel Inc. is going to provide a 24-hour forecast type of presentation on cable network.

Mr. Coleman. That is correct.

Mr. Carney. You anticipate that in a 3-year time frame you can generate a profit and that is probably one of the motives that you are going into this business, is that correct?

Mr. Coleman. I do not think that there is a shadow of a doubt that Landmark Communications has invested the upward of $30 million in the startup of this enterprise and committed to the operating budget of approximately $12 million a year without the strong expectation of an excellent return on that investment and profits to be reaped from it in the years ahead. The cable television industry is, as I am sure you know, a booming industry. There are 4 million American homes being wired per year. We are positioning ourselves in that industry to watch the booming growth, and as it takes place, yes, we will become a very profitable enterprise.

Mr. Carney. Well, don't you think then that it would only be fair that you pay fees for the services the National Weather Service provides for you?

Mr. Coleman. I would assume that at the point where we become a profitable operation that paying user's fees would not be unreasonable for our company. Now, what I would say to you is that if when I, as the promoter of this service—and frankly I promoted it not to make money, because I make quite a bundle from "Good Morning America."

Mr. Carney. Do you have any special tax breaks?

Mr. Coleman. I have an attorney who works very hard at making it work right for me.

The tax discussion is so intriguing I have forgotten the meteorology.

The question of my motive is that I was so frustrated after 28 years in over-the-air television that on "Good Morning America" I have 1½ to 2 minutes to try to cover the weather for 50 States, and that the technology that I was using did not provide any manner for me to properly localize or to divide up dates or warnings and that that format seemed to be well-entrenched. It is a wonderfully effective system for ABC. For the communication of meteorological information it is frustrating. So that is my motive, frankly, in starting the Weather Channel.

Now, Landmark's motive is obviously its commercial investment. They are a communications company, they believe in quality products, but there is no question that profit must be part of that plan. I took this scheme and plan to Landmark. If I had gone in with significant user's fees that had made a significant impact on the opportunity of this company to produce a profit, it would not exist. They would have rejected the idea. This outlet, if it had come along prior to user's fees being considered, or after user's fees had been established, probably would not have happened. Now, after it becomes established, we will be able to pay some user's fees.

Mr. CARNEY. Would I assume then you are not opposed to user's fees?

Mr. COLEMAN. What I am saying is that we would be able to pay them. Now, I just want you to know that what we would be able to pay in comparison to the overall task of the National Weather Service would really be quite minimal. I do not think it would be significant, hardly worth the administration. Remember, the Weather Channel is the largest, private meteorological concern in the Nation, so if this one company which I had were in a position to pay some user's fees, and therefore, a system of user's fees were adopted by Congress for users of National Service data, we would have it and nobody else would. I do not think there is anybody else, frankly, that could afford to pay them.

Mr. CARNEY. This prompts another thought that has come into my mind. You have set up a network of 52 meteorologists and you are going to be on 24 hours a day. Certainly, you in turn could take all that information that you are getting from the various sources provided to you by our great benevolent Government and sell that service to the other television networks.

Mr. COLEMAN. Assuming they would buy it——

Mr. CARNEY. Why wouldn't they?

Mr. COLEMAN. Because they do not feel much need for it. May I take an example. How many dollars is NBC paying today for meteorological information for its network program?

Mr. CARNEY. I do not know the precise amount. I believe you are on ABC.

Mr. COLEMAN. That is right.

Mr. CARNEY. How many dollars is ABC paying?

Mr. COLEMAN. About $120,000 a year other than salaries for the meteorological facility and input—a very small amount. I am suspecting that my competitors on the "Today Show," which is what I am getting at, probably spend a fraction of that. We are not talking, Mr. Carney, of enough dollars to have any significant impact. If it is a token that the committee seeks, I think that you can elicit the token. If it is meaningful financial support for the National Weather Service I think you are going to be very disappointed.

Mr. CARNEY. I think you bring out something important there. You spend $125,000 for the service but I dare say that perhaps you yourself and the other two networks that have these types of shows probably pay more for the person who is going to deliver those services.

Mr. COLEMAN. Oh, absolutely.

Mr. CARNEY. The reason they do that is because they are trying to attract viewership so they can sell their commercial time.

Mr. COLEMAN. It is a star business.

Mr. CARNEY. Absolutely.

Mr. COLEMAN. Yes.

Mr. CARNEY. I do not see then what the problem is in paying for user's fees for something that is very very important for you to enhance your viewership, and that is providing weather service to the people.

Mr. COLEMAN. Now I think that you have hit on exactly the point. I think that providing significant meteorological content for television program and providing it to the American public is a very worthwhile service. I do not know that that commitment runs through the television and straight at the Nation, sir. They like to hire stars, clowns, beautiful women, whatever, and I am not so sure that they are interested in providing that meteorological information—certainly not if they have to pay for it.

Mr. CARNEY. I have one further question. Do you think the Federal Government should provide the basis of the sportscast for Howard Cosell in another name and then give it out. It would be the same thing, wouldn't it?

Mr. COLEMAN. I think it could be the same thing if the public interest, safety, and convenience were served by the sportscast.

Mr. CARNEY. Certainly the public convenience is.

Mr. COLEMAN. You made an interesting comment when talking to Mr. Ryan. You said the sports part of the newscast was probably more popular than the weather. I will share a little research with you. The weather is the most popular segment of any newscast on television. The sports is the least popular segment. Sports events such as NFL football games and major league baseball games draw significant television audiences but the sports report within the newscast is actually the least demanded part of that package and the weather is the most demanded.

Mr. CARNEY. I should have recognized that, considering that you give the weather and Howard Cosell gives the sports on WABC. I should have. That was rather obvious. [Laughter.]

Mr. CARNEY. I thank you, Mr. Chairman.

Mr. SCHEUER. I have just a followup question on that point. If that is true, and I am sure it is, why don't they place a higher priority on giving really first-class weather information to the public? That is what the public wants.

Mr. COLEMAN. I suppose that ABC would answer that we are. After all, we are supporting this enterprise with John Coleman on "Good Morning America." But by the same token the television business is, I do not think, the subject of this hearing, but it is a different kind of business, sir. It is "show biz." [Laughter.]

Mr. SCHEUER. I also serve on the Communications Committee. Perhaps you can come to that committee some time and tell us about the television.

Mr. COLEMAN. It is "show biz" oriented. To make a correlation between providing excellent weather service and ratings, I think it exists but I am not certain that the broadcast industry realizes it or appreciates it or supports it.

Mr. SCHEUER. It is interesting that they slavishly follow the Nielsen ratings and it seems that if they do and they are sharp—we have no reason to believe they are not—they would have more weather and less sports if the voice of the people out there tells them that sports is the least popular of the elements in their morning news show and that weather is the most popular.

Mr. COLEMAN. And there is no question they spend more money on the sports part of the program than the weather part.

Mr. SCHEUER. Why is that?

Mr. COLEMAN. It is because the weather part has been traditionally free. It is because the weather part of the program is very basic. It is a basic service part of the program, almost utilitarian. It does not have the glamour and glitz of "show biz." It is very standard kind of fodder, not the sort of thing that gets a television executive excited. Your concept of user's fees, again I say, I do not have any difficulty with except I am telling you it will be a bitter disappointment to you when you try to collect them because there is not much out there that you will get.

Mr. SCHEUER. Except for the big industrial, the agro-business community.

Mr. COLEMAN. There is not much there though, there really isn't. It is a very small business, sir.

Mr. SCHEUER. Yes; all right. Mr. Sensenbrenner?

Mr. SENSENBRENNER. Yes; thank you very much, Mr. Chairman. I would like to ask a couple of questions relative to the closures of Weather Service offices in degrading the accuracy of the forecast. I happen to come from a part of the country that has had some pretty severe weather last month. That is southeastern Wisconsin. We have been hit by a couple of bad snowstorms and have had some very bone-chilling weather.

The Weather Service closed its full-time forecast office in Milwaukee last year, which shows how much they listen to members of this subcommittee who authorize their budget—but that is neither here nor there. But it seems to me that the accuracy of the forecast that came out this year under the new reduced structure of weather forecast offices was greater than I can remember.

The testimony of one of the following witnesses, Dr. Suomi of the University of Wisconsin at Madison, indicates that in the case of the three major weather systems that went through Wisconsin in January 1982, we had a good 2 days' warning for all of them, even though the one full-time Weather Service forecast office in our State had been closed last year by the National Weather Service. Now, how do you reconcile the statements that you made with the fact that the product—at least insofar as these three weather systems were concerned—was actually better?

Mr. COLEMAN. I am of the personal opinion that the point at where the local forecast is prepared is of somewhat insignificance relative to the quality of that forecast. The observations that are coming in on which that forecast is based are essential. In other words, I would contend, Congressman, that I could sit in Atlanta, Ga., my current home, and where the Weather Channel is located, and use our facility there and predict the weather in Milwaukee as accurately as a forecaster sitting in Milwaukee, assuming that I have the same data sources. In the proposed cutbacks, when we eliminate Lacrosse, Wis., and Dubuque, Iowa, and cut back the Weather Service office at Rockford, Ill., those will impact significantly on the quality of the forecast that you receive from Milwaukee, Wis.

Mr. SENSENBRENNER. Because we have gotten pretty accurate forecasts two days ahead, obviously the weather systems had not reached Rockford, Lacrosse, and Dubuque at the time those forecasts were made.

Mr. COLEMAN. Your point is well made in terms of winter storms. In terms of the short duration summer storms, however, I think those nearby offices are much more important to you. In terms of the office in Milwaukee or the office serving Milwaukee, wherever it might be issuing travel information advisories, as a "for instance," and agriculture advisories, I think it is very difficult to do so without good current observations over a period hour after hour from nearby stations. In terms of your winter storms, may I suggest to you that your point is well made, but if you could close down the station at Sheridan, Wyo., or the station at Flagstaff, Ariz., or the one at Lewiston, Idaho, that data missing may well impact on your forecast for tomorrow and tomorrow night and the day after.

Mr. SENSENBRENNER. Thank you very much.

Mr. SCHEUER. Well, thank you very much, Mr. Coleman. It has been very rewarding meeting you personally after having spent so many early morning hours with you and snarling at your reports of bad weather. [Laughter.]

You have been the recipient of a lot of curses and implications from me. It is a great pleasure to meet you and it is particularly a great pleasure, after your more or less straight reporting of weather on television, to see what an extraordinarily thoughtful, professional, and interesting person you are.

Mr. COLEMAN. Thank you, Mr. Scheuer.

Mr. SCHEUER. It has been a real revelation. I have enjoyed it greatly.

Mr. SCHEUER. Now we will go ahead with the next panel: Dr. Robert M. White of the University Corporation for Atmospheric Research; Dr. George S. Benton of Johns Hopkins University; and Dr. Verner E. Suomi of the University of Wisconsin. I might mention to all of you as you gather about the table that your testimony will be printed at the appropriate point in the record in full, so that you should not feel constrained to either read it or repeat every point you have made. We have all read your testimony and enjoyed it.

We are going to ask you, because we have a very full schedule and because we must vacate this room at 12:30, to sum up your prepared testimony in 5 minutes. We know that Dr. Suomi has some slides, so we will be flexible with your slide show but we really are under time pressure and I apologize for that.

Why don't we take you in the order that I listed you, Dr. Robert White first, and then we will hear from the other two. Then I am sure we will have questions.

Dr. White?

STATEMENT OF DR. ROBERT M. WHITE, UNIVERSITY CORPORATION FOR ATMOSPHERIC RESEARCH

Dr. WHITE. Mr. Chairman, members of the committee, I welcome the opportunity to discuss some of the policy issues raised by the budget proposals for the NOAA weather services in 1983. Nothing fixes policy so well as a budget document.

I appear here in my personal capacity. I am president of the University Corporation for Atmospheric Research, a consortium of 48 universities which operates the National Center for Atmospheric Research. I am also a member of the National Advisory Committee for Oceans and Atmosphere. These institutions have a direct interest in atmospheric affairs but the views expressed are my own.

As a former Administrator of NOAA, it is with some hesitancy that I offer these comments, lest they be construed as second-guessing very difficult decisions of the present Administrator and the administration. In a time when most Government agencies——

Mr. SCHEUER. That is exactly what we are interested in hearing from you.

Dr. WHITE. I will comment, sir, but with some hesitancy.

In a time when most Government agencies are being asked to reduce spending, it is not unreasonable that NOAA should shoulder some of the burden.

Mr. SCHEUER. I do not want to keep interrupting you, and I will try as hard as I can not to. This administration has made a great point of seeing to it that the expenditures by the Government are cost effective and that they produce benefits far in excess of costs. I do not believe that Reaganomics means just taking a meat axe to the budget. I think it means an intelligent scrutiny of each program on its merits, pruning those that are not productive from the cost-benefit point of view and supporting or even expanding those that produce benefits far in excess of their costs.

Therefore, it seems to me that there is nothing fair or unfair about asking NOAA to assume some kind of arbitrary cut. That would make legislating too simple, if you just took a meat axe to NOAA and said, "All right, 10 percent or 20 percent, whatever it is." We are trying to be intelligent and thoughtful, to prune the fat and to reorganize and recast programs so that they are productive and so that the taxpayers' dollars are spent wisely.

It may be that the greatest contribution we can make to our economy and to our society is to expand NOAA. I do not know, but we are not here under any assumptions that anything has to be slashed or anything has to be built up. We are here to evaluate programs on the individual merits, and we look forward very much to your testimony because we know that from the vantage point of a man in front of whom the buck stopped, that you are going to have some valuable insights for us.

Excuse me. I apologize for the interruption.

Dr. WHITE. I fully concur with your views, Mr. Chairman. I have no problem with them at all and I will be very specific in my testimony.

Mr. SCHEUER. My interjection will be on my 5 minutes, not your 5 minutes. [Laughter.]

Dr. WHITE. I want to discuss two general issues, Mr. Chairman. The first one is the provision of observational capabilities necessary to monitor weather conditions and, second, the provision of weather information to those who need it.

The weather observational capabilities made available by changing technology of the past 2 decades have advanced steadily. For example, weather satellites provide us with remarkable observations of certain atmospheric conditions, and remote sensing technology has enabled us to probe large volumes of the atmosphere remotely from a single site.

The new observational technology, however, does not entirely replace requirements for more conventional observations at the surface of the Earth or in the free atmosphere. In some cases they allow us to cut back on conventional observations and eventually eliminate some of them. Principally, they give us information about atmospheric phenomena which results in improved services.

A continuing policy issue concerns the relative allocation of resources to new technological methods of observing atmospheric conditions versus those to more conventional observing techniques and for weather services as a whole. This issue is prominently raised in the fiscal year 1983 budget proposal. The fact that we must contend with is the rapidly increasing costs of new technological systems for observation in the face of seriously constrained total budgets for weather services.

Satellite costs have escalated dramatically and are expected to continue to do so. Even with cutbacks in the polar-orbiting satellite system, the preponderance of the increases for NOAA are in the satellite area—some $40 million for fiscal year 1983. The decision to cut back the polar-orbiting system from two to one satellite is, in my view, a difficult but reasonable step if the remainder of the National Weather Service is to remain healthy. Our national weather services are more directly served by observations from geostationary satellites, and further impairment of other weather services would not serve the public well.

However, polar-orbiting satellites serve not only ourselves but other nations of the world, and other nations have come to depend upon these data. Until now, the United States has fully funded the polar-orbiting satellite system, making the data available to other nations. It seems to me that the time may be propitious to examine the feasibility of international funding and management of polar-orbiting weather satellites as a means of reducing U.S. costs while maintaining an important satellite system.

Of the new observational possibilities, perhaps the most important for providing warnings of weather hazards are modern doppler weather radars. The NEXRAD program provides for them. These radars will provide us with a means of tracking and a basis for forecasting severe weather phenomena which we do not presently have.

I am pleased to see the program continue to move ahead. The funding in the President's budget for NEXRAD is thin, will require a high-risk approach to development, and will stretch out the implementation time beyond 1990. NACOA and other groups, such as the National Academy of Sciences, have placed high priority on this program. If we are going to do it at all, we ought to do it right by providing adequate funds for development and implementation at the earliest possible date.

Weather observations inevitably raise the issue of the closure of weather stations. How many weather stations do we need? The local weather station provides services that communities want and need. Weather stations serve two quite different purposes, and decisions about their establishment or closure need to be based on quite different assessments.

Weather stations are used to acquire observations at the surface of the Earth and also in the upper air through balloon-borne radiosondes. Surface observations can be taken to a certain extent by automatic weather stations, and considerable attention has been paid to the development of such automatic weather stations in past years. There are such stations available for deployment.

Automatic weather stations cannot, however, do everything that can be done by human observation but they are getting to be a reasonable substitute. Further, observations can be obtained by contracting with private companies or by other entities in the locality, and frequently this is done.

Observations are needed because of scientific or regulatory need. At some point we should seek to establish a generally accepted scientific basis for an adequate network. Perhaps an organization like the National Academy of Sciences could conduct the necessary study to provide the executive branch and the Congress with a sound scientific basis for a weather observation network which could be accepted by all and serve as a basis for national policy on this matter. The regulatory need for surface observations is indeed that—a legal requirement—and wherever it is mandated it must be met, as for example at airports.

Weather stations, however, are also mechanisms for disseminating weather information and providing service to local communities. How much service should be provided is a political decision. Many stations have been established by decisions of the Congress because of judgments about service needs of communities.

The proposed closure of 45 weather stations in the fiscal year 1983 budget must be judged, then, against these two criteria. We spend much effort each year in attempting to close stations, with little yield in terms of the savings to the Federal Government.

It seems to me that if we continue to expend satellite expenditures, we will either kill the satellite systems, which have now become essential to providing weather services, or kill the rest of the Weather Service, which would be unacceptable to all. We need to take a different approach, which must ask whether additional benefits from satellites are worth their cost, and not view them in competition. How much service is enough? Only you can decide.

A major policy issue arising in connection with the new proposals centers around the question of user fees. Here we approach the question of how the Weather Service should be funded. It is proposed that the aviation weather service be funded through the FAA's Airport and Airway Trust Fund, which derives its income from taxes on aviation fuel.

I think this is a sound suggestion and should be supported by the Congress. As we know only too well from recent aviation accidents, weather is a key factor in the safe operation of the Air Traffic Control System, as much so as runway lighting, and is an essential part of the aviation support infrastructure. As such, it is proper that it should be funded by user fees. Perhaps in this way we can actually strengthen the funding for an improved aviation weather service.

I have, however, a sense of foreboding. Congress must insure that this funding transfer does not turn into a "catch 22" for the Weather Service. The FAA has traditionally provided extensive funding for weather operations to support not only aviation weather service but the broader public weather services. It is essential that the Congress not only support these funds in the FAA budget, where they will be manifest, but it must also support the continued provision of funds for other weather operations now in the budget of the FAA. Unless this is assured, we will certainly face a crisis in the provision of aviation and other weather services. Because of the importance of this general topic, the National Advisory Committee for Oceans and Atmosphere is conducting a study of general policy issues of weather service funding and operation.

Cutbacks in specialized services in agriculture and forestry weather are also proposed. Some will take the position that this is an opportune time for the Federal Government to stop providing specialized services which can just as easily be provided by the private sector. I am a strong supporter of a vigorous private sector but I believe that the private sector will provide only such services as will yield a profit. There is, in my view, a national interest in insuring that adequate weather information is available even to those elements in agriculture who are not able to secure private weather services.

I have a further concern: My own experience suggests that what will actually happen if the weather services for agriculture provided by NOAA are cut back, will be the growth within the Department of Agriculture of its own weather services to meet the needs of its constituencies. I see the specter of the growth of multiple and separate weather services in this Nation. This can only lead to more costly weather services in the future, and I suggest that the press release issued by NOAA—on page 8, if you will read it—suggests that they are actually suggesting that other agencies take these over.

One has a sense of déjà vu. About 20 years ago the Congress was concerned about duplication in weather services. Under the leadership of Senator Margaret Chase Smith of Maine, the Congress prevailed upon the executive branch to coordinate weather services of this Nation. OMB Circular A-62 resulted, which called for the provision of common weather services by a single agency, the National Weather Service. It is a remarkable document, and provides for efficient and economical weather service for all users. We are now heading in the opposite direction. The savings achieved by the weather services are likely to be more than made up by future expenditures that I predict will be made by the Department of Agriculture to fill the gap, and while there will be some gain, they will be minor compared to the damage that will have been done. The proposals which call for consolidation for some of the administrative apparatus in the Weather Service regions makes sense in a period of constrained budgets.

While the cutbacks in the weather services proposed in the fiscal year 1983 budget may not have severe, immediate impact by themselves, they are one further step toward a weakened Weather Service. It is important to realize that over the past decade we have witnessed a gradual whittling back of the activities of the Weather Service. There has been the closure of a few weather stations here, a few ocean stations there, a withdrawal from a program here, and a withdrawal from a program there.

We need to ask what the cumulative effects of these small changes are. We do not know. We are conducting an experiment to see how far we can go. Have we confused efficiency with effectiveness? Will we recognize the point at which the system is no longer able to provide the warnings which the public needs and deserves for its protection? I doubt that we will. I doubt that we are that wise.

The atmosphere operates in strange ways. When the weather is good there is little need for a weather service. Aircraft fly, farmers plant and harvest, and people go to the beaches. However, it is when the atmosphere becomes violent that our weather services become stressed.

I recall Hurricane Agnes, which moved across the eastern United States in June of 1972. It literally drowned the east coast. We had the largest number of rivers in flood at the same time, from the James in Virginia to the rivers of New England. We had to evacuate hundreds of thousands of people.

There were hardly enough people to man the weather stations. Our forecasters and observers worked night and day, slept in weather stations to carry out their duties. The Weather Service came through, although not without significant criticism. Will it take another major weather disaster to tell us when our system has deteriorated to a point where stresses will cause it to fail, and where the consequences in human life and property will be enormous? I do not know the answers to that question. It is something I think the Congress must judge but I do know that I am deeply concerned.

Thank you, Mr. Chairman.

[The prepared statement of Dr. White follows:]

TESTIMONY OF

Dr. Robert M. White*

Mr. Chairman and members of the Committee, I welcome the opportunity to discuss some of the policy issues raised by the budget proposals for NOAA weather service programs in FY-1983. Nothing fixes policy so well as a budget document.

I appear here in my personal capacity. I am President of the University Corporation for Atmospheric Research (UCAR), a consortium of 48-universities which operates the National Center for Atmospheric Research (NCAR). I am also a member of the National Advisory Committee for Oceans and Atmosphere (NACOA). These institutions have a direct interest in atmospheric affairs but the views expressed are my own.

As a former Administrator of NOAA, it is with some hesitancy that I offer these comments lest they be construed as second guessing very difficult decisions of the present Administrator and Administration. In a time when most government agencies are being asked to reduce spending it is not unreasonable the NOAA should shoulder some of the burden.

I should like to discuss two general issues.

1) The provision of observational capabilities necessary to monitor weather conditions.
2) The provision of weather information to those who need it.

The weather observational capabilities made available by changing technology of the past two decades have advanced steadily. For example, weather satellites provide us with remarkable observations of certain atmospheric conditions, and remote sensing technology has enabled us to probe large volumes of the atmosphere remotely from a single site. The new observational technology, however, does not entirely replace requirements for more conventional observations at the surface of the earth or in the free atmosphere. In some cases, they allow us to cut back on conventional observations and eventually eliminate some of them. Principally, they give us new information about atmospheric phenomena which results in improved services.

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* These remarks are made in Dr. White's personal capacity and do not represent the views of the University Corporation for Atmospheric Research(UCAR) or the National Advisory Committee of Oceans and Atmosphere (NACOA)

A continuing policy issue concerns the relative allocation of resources to new technological methods of observing atmospheric conditions versus those to more conventional observing techniques and for weather services as a whole. This issue is prominently raised by the FY-1983 budget proposal. The fact we must contend with is the rapidly increasing cost of new technological systems for observation, in the face of seriously constrained total budgets for weather services. Satellite costs have escalated dramatically and are expected to continue to do so. Even with cutbacks in the polar orbiting satellite system, the preponderance of the increases for NOAA are in the satellite area....some $40 million for FY-83. The decision to cut back the polar orbiting system from two to one satellite is in my view a difficult but reasonable step if the remainder of the national weather service is to remain healthy. Our national weather services are more directly served by observations from geostationary satellites and further impairment of other weather services would not serve the public well. However, polar orbiting satellites serve not only ourselves but other nations of the world and other nations have come to depend upon these data. Until now, the United States has fully funded the polar orbiting satellite system making the data available to other nations. It seems to me that the time may be propitious to examine the feasibility of international funding and management of polar orbiting weather satellites as a means of reducing U.S. costs while maintaining an important satellite system.

Of the new observational possibilities perhaps the most important, for providing warnings of weather hazards, are modern doppler weather radars. The NEXRAD program provides for them. These radars will provide us with a means of tracking and a basis for forecasting severe weather phenomena which we do not presently have. I am pleased to see the program continue to move ahead, but funding in the President's budget for NEXRAD is thin, will require a high risk approach to development, and will stretch out the implementation time beyond 1990. NACOA and other groups, such as the National Academy of Sciences, have placed high priority on this program. If we are going to do it at all, we ought to do it right by providing adequate funds for development and implementation at the earliest possible date.

Weather observations inevitably raise the issue of the closure of weather stations. How many weather stations do we need? The local weather station provides services that communities want and need. Weather stations serve two quite different purposes and decisions about their establishment or closure need to be based on quite different assessments.

Weather stations are used to acquire observations at the surface of the earth and also in the upper air through balloon borne radiosondes. Surface observations can be taken to a certain extent by automatic weather stations and considerable attention has been paid to the development of such automatic weather stations in past years and there are such stations available for deployment. Automatic weather stations cannot, however, do everything that can be done by human observation but they are getting to be a reasonable substitute. Further, observations can be obtained by contracting with private companies or by other entities in a locality, and frequently this is done.

Observations are needed because of scientific or regulatory need. At some point we should seek to establish a generally accepted scientific basis for an adequate network. Perhaps an organization like the National Academy of Sciences could conduct the necessary study to provide the Executive Branch and the Congress with a sound scientific basis for a weather observation network, which could be accepted by all and serve as a basis for national policy on this matter. The regulatory need for surface observations is indeed that, a legal requirement and wherever it is mandated it must met as, for example, at airports.

Weather stations, however, are also mechanisms for disseminating weather information and providing service to local communities. How much service should be provided is a political decision. Many stations have been established by decisions of the Congress because of judgments about service needs of communities.

The proposed closure of 45 weather stations in the FY-83 budget must be judged then against these two criteria. We spend much effort each year in attempting to close stations with little yield in terms of the savings to the federal government.

It seems to me that if we continue to compete satellite expenditures against conventional expenditures, we will either kill the satellite systems which have now become essential to providing weather services, or kill the rest of the weather service which would be unacceptable to all. We need to take a different approach which must ask whether the additional benefits from satellites are worth their cost and not view them in competition. How much service is enough? Only you can decide.

A major policy issue arising in connection with the new proposals centers around the question of user fees. Here we approach the question of how the weather service should be funded. It is proposed that the Aviation Weather Service be funded through the FAA's Airport and Airway Trust Fund which derives its income from taxes on aviation fuel. I think this is a sound suggestion and should be supported by the Congress. As we know only too well from recent aviation accidents, weather is a key factor in the safe operation of the Air Traffic Control System, as much so as runway lighting and is an essential part of the aviation support infrastructure. As such it is proper that it should be funded by user fees. Perhaps in this way we can actually strengthen the funding for an improved aviation weather service.

I have, however, a sense of foreboding. Congress must ensure that this funding transfer does not turn into a "Catch 22" for the weather service. The FAA has traditionally provided extensive funding for weather operations to support not only the aviation weather service but the broader public weather services. It is essential that the Congress not only support these funds in the FAA budget, where they will be manifest, but it must also support the continued provision of funds for other weather operations now in the budget of the FAA. Unless this is assured, we will certainly face a crisis in the provision of aviation and other weather services. Because of the importance of this general topic, NACOA is conducting a study of the general policy issues of weather service funding and operation.

Cutbacks in specialized services in agriculture and forestry weather are also proposed. Some will take the position that this is an opportune time for the federal government to stop providing specialized services which can just as easily be provided by the private sector. I am a strong supporter of a vigorous private sector, but I believe that the private sector will provide only such services as will yield a profit. There is, in my view, a national interest in ensuring that adequate weather information is available even to those elements in agriculture, who are not able to secure private weather services.

I have a further concern. My own experience suggests that what will actually happen if the weather services for agriculture provided by NOAA are cut back will be the growth within the Department of Agriculture of its own weather services to meet the needs of its constituencies. I see the specter of the growth of multiple and separate weather services in this nation. This can only lead to more costly weather services in the future.

One has a sense of "deja vu". About 20 years ago the Congress was concerned about duplication in weather services. Under the leadership of Senator Margaret Chase Smith of Maine, the Congress prevailed upon the Executive Branch to coordinate the weather services of this nation. OMB Circular A-62 resulted, which called for the provision of common weather services by a single agency -- the National Weather Service. It is a remarkable document and provides for efficient and economical weather services for all users. We are now heading in the opposite direction.

The savings achieved by the cutback in the agriculture and fire weather services are likely to be more than made up by future expenditures that I predict will be made by the Department of Agriculture to fill the gap. And while there will be some gain for private weather services, they will be minor compared to the damage that will have been done. The proposals which call for consolidation for some of the administrative apparatus in the weather service regions makes sense in a period of constrained budgets.

While the cutbacks in the weather services proposed in the FY-83 budget may not have severe immediate impact by themselves, they are one further step toward a weakened weather service. It is important to realize that over the past decade we have witnessed a gradual whittling back of the activities of the weather service. There has been the closure of a few weather stations here, a few ocean stations there, a withdrawal from a program here and a program there. We need to ask what the cumulative effects of these small changes are? We don't know. We are conducting an experiment to see how far we can go. Have we confused efficiency with effectiveness? Will we recognize the point at which the system is no longer able to provide the warnings which the public needs and deserves for its protection? I doubt that we will. I doubt that we are that wise.

The atmosphere operates in strange ways. When the weather is good there is little need for a weather service -

aircraft fly, farmers plant and harvest, and people go to the beaches. However, it is when the atmopshere becomes violent that our weather service system becomes stressed. I recall Hurricane Agnes which moved across the eastern United States in June 1972. It literally drowned the east coast. We had largest number of rivers in flood at the same time ...from the James in Virginia to the rivers of New England. We had to evacuate hundreds of thousands of people. There were hardly enough people to man the weather stations. Our forecasters and observers worked night and day, slept in weather stations to carry out their duties. The weather service came through, although not without significant criticism. Will it take another major weather disaster to tell us when our system has deteriorated to a point where stresses will cause it to fail, and where the consequences in human life and property will be enormous? I don't know the answer to that question. It is something that the Congress must judge. I know that I am concerned.

Mr. SCHEUER. Very, very good, interesting testimony.

Now we will hear from Dr. George S. Benton. I repeat, we are operating under tremendous time constraints so I hope you will sum up your testimony.

STATEMENT OF DR. GEORGE S. BENTON, JOHNS HOPKINS UNIVERSITY

Dr. BENTON. Thank you, Mr. Chairman. I will do my best.

In my full testimony submitted for the record, I have considered a number of policy issues and related them to budget questions. Today I would like to concentrate on two items: the request to close 20 part-time and 25 full-time weather stations; and, the proposal to downgrade the polar-orbiting satellite system.

The request to close 20 part-time and 25 full-time Weather Service offices continues the effort of the administration to reduce the manned observation network on which all weather forecasts are based. I am deeply concerned about these proposals.

In periods of bad weather, personnel at a weather station office operate under tremendous pressure. Closing 45 Weather Service offices and transferring their responsibilities to neighboring stations will increase these pressures, reduce the reaction time available to

Weather Service personnel in emergency situations, and generally decrease the reliability and effectiveness of the service.

Will the system collapse? Certainly not. Will the service to the public be reduced? Unquestionably. Will the likelihood of a missed forecast of severe weather increase? Almost certainly yes.

Where are we heading? One gains the impression that the station closures are put forward for one purpose only: to reduce appropriations for the Weather Service to some arbitrary, predetermined level. This goes back to your comments, Mr. Chairman, that we really should not assign arbitrary targets to any agency.

There has been no determination of the required or optimum number of manned weather stations. Will future budgets bring on additional requests to further reduce the number of manned stations? At what point will we so overload the remaining stations that public welfare and safety will be seriously damaged? We had better consider these questions before we arbitrarily continue to tighten an already overstressed service.

The need for weather observations is recognized by the administration. Funds are set aside in the budget to negotiate contracts with commercial firms to take observations at the 25 full-time Weather Service offices which are recommended to be closed. However, this process poses other problems. The National Weather Service is forced to rely more and more on observations by contract, as its number of personnel and its real funding are reduced.

Again, where are we heading? What is happening to quality control when observations are turned over to commercial firms with no long-term professional commitment to meteorology? What are the costs of contract negotiation and renegotiation? How are the problems of equipment maintenance going to be managed? Are the "savings" overestimated when these factors are considered? There are no solid answers to these questions.

I maintain that we cannot gut the effectiveness of the National Weather Service by a series of ad hoc decisions designed solely to reduce appropriations. If we cannot afford the present level of funding for the National Weather Service—a conclusion which I seriously question—then let us develop a plan of action leading to a reconstructed service which will maximize efficiency and minimize loss of effectiveness. Pending the development of such a road map, let us move with extreme caution.

Let me turn now to the polar-orbiting satellite system. The NOAA budget for fiscal year 1983 proposes a major downgrading of the polar-orbiting satellite system. The request is euphemistically labeled "a one polar-orbiting satellite system with replacement launches scheduled on 18-month centers." The brutal fact is that the proposed plan of operation does not guarantee one satellite in orbit. It is entirely possible, even likely, that during the next several years if this plan is adopted there will be one or more intervals of months or even a year or more in which there are no polar-orbiting satellites in orbit.

Mr. Chairman, the compelling reason for the present two-satellite system is not the increased data available from the double coverage, valuable as this may be. The primary motivation is the need for an in-orbit backup. With two satellites in orbit, when one fails the other one is still available. And when we go to Shuttle launch, it may take 5 or 6 months to put a satellite into orbit from the ground if one fails aloft.

The operating procedure proposed in the NOAA fiscal year 1983 budget calls for, and I quote, "launches every 18 months regardless of the status of the in-orbit satellite." There are now two orbiting, operating polar satellites. One has already outlived its expected lifespan; the second has been in service a comparatively short time. Failure of the older of the in-orbit satellites is expected well in advance of the proposed fiscal year 1983 launch of NOAA-D.

Total interruption of satellite coverage could occur in a variety of ways. Early failure of the second polar orbiter might occur prior to the scheduled launch of the new satellite; or, if we were unfortunate, NOAA-D when it is launched in fiscal year 1983 might fail on the pad or as it was be placed into orbit. This would leave us without a satellite for a long period of time. The possibility of launch failure cannot be discounted lightly. NOAA-B was lost in that way.

It does no good to suggest that a launch might be accelerated if a total interruption of service occurred. The fiscal year 1983 budget eliminates funds required for satellite acquisition. If the budget is approved as submitted, the system is frozen for many years to come on a 18-month launch schedule, with total interruptions of satellite a constant threat.

What would be the effect of an interruption in polar-orbiting satellite data? These satellites provide essential information for our operational weather system. In addition to visible and infrared images of clouds, radiometers are used to measure the vertical distribution of atmospheric temperature. The satellite is used as a platform from which remote stations are interrogated.

Beginning with NOAA-E, the orbiting satellites will carry search-and-rescue instruments to locate downed aircraft and disabled ships. Orbiting satellites will also be used to measure the amount and distribution of ozone and to monitor the radiation balance of the Earth—important for determination of climate change.

Finally, the orbiters have a capability known as automatic picture taking. Countries all over the world interrogate our satellite as it passes overhead and obtain images which show the distribution of clouds and weather over and near their territory. These images are of vital importance to many developing nations which have only primitive weather-observing systems. We spend a lot of money to aid developing countries; this is an assistance to developing countries which goes unnoticed.

The changes recommended by the administration result in savings of $185 million over 6 fiscal years. This is an average saving of about $30 million a year. This must be compared to the national investment of many billions of dollars annually in the space program. This is not an attack on the NASA budget. I support a strong and effective space program.

However, in my opinion there is something wrong with the priorities in the national budget when billions of dollars are spent for research and development in the space program, and the only operational satellite system in the civil space program is sacrificed to save a comparatively inconsequential sum. This country must be willing to capitalize on and reap the benefit of our R. & D. program. We cannot afford to let research and development become an end in itself.

There are many other proposed reductions which I think are characterized by such adjectives as "destructive" and "short-sighted." The agricultural weather services are a good example. The administration budget says that the savings to farmers resulting from agricultural weather services is $30 to $100 for every dollar expended. I would like to submit, Mr. Chairman, that with such savings the return in the form of increased taxes is more than enough to pay for the operation of the agricultural weather activities of the National Weather Service. I share Dr. White's concern that if this service is not made available through the National Weather Service, other ways of providing this support to agriculture will spring up within the Government.

I share the concerns that have been expressed about NEXRAD. It makes no sense to develop this tremendous technology at great cost and then to delay its acquisition for operations until the mid-1990's: Over a decade from now and almost 20 years from the date when the Weather Service first requested the necessary appropriations from the Office of Management and Budget.

Finally, I would like to mention research and development programs such as the global atmospheric research program, the world climate program, and weather modification. These are long-range programs which seek to improve our weather services and our weather system over a period of many years. Sacrificing these programs today will cost us great sums tomorrow.

Mr. Chairman, in conclusion, I must emphasize that reducing the budget is more of an objective than a policy. We must have policies which permit decisions—no, mandate decisions—which are in the best long-term interest of our country. Destroying research and development programs which are designed to produce long-term gains and advantages may in the short run help reduce budget deficits but it will not in the long run build a stronger program of science and technology or stronger weather services.

Similarly, deferring or eliminating necessary operational or procurement expenditures may reduce outlays now but in years to come will perpetuate inefficiencies and ineffectivenesses in our weather service. I fully understand the tremendous pressures on the administration and Congress to reduce the Federal deficit for fiscal year 1983 but I am forced to say, that in my opinion, the administration's budget for NOAA reflects too much of the "save now, pay later" point of view.

Thank you, Mr. Chairman.

[The prepared statement of Dr. Benton follows:]

WEATHER SERVICES AND SUPPORTING RESEARCH IN THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), FY 1983.

Testimony by George S. Benton

I am pleased to have the opportunity to appear before the Subcommitte on Natural Resources, Agriculture Research and Environment to discuss the program for weather services and supporting research proposed by the Administration for NOAA in FY 83.

This hearing is both timely and important. There is a substantial unfilled need for more effective use of weather and climate information in support of national economic, social, and political objectives. In normal circumstances, NOAA programs and budgets would show real growth. But these are not normal times. Our nation is in the midst of a reevaluation of the appropriate role of the federal government in our society. Given the unprecedented pressures on the federal budget, it is necessary that each appropriation be examined with special care. It is equally true, however, that the present situation should not be used unthinkingly to justify budget reductions which are counterproductive and which in the long run will exacerbate rather than alleviate our difficulties.

Perhaps it would be useful if I briefly summarize my professional experience, so that the members of the Subcommittee can evaluate my ability to judge the effect on weather services and supporting research of the Administration's FY83 budget requests. I have been active in meteorological research and science administration for over forty years. I am a Past-President of the American Meteorological Society, and am now Professor of Meteorology at The Johns Hopkins University. From 1966-69 I was Director of the Environmental Research Laboratories, now a part of NOAA. More recently, I served for three years as the Associate Administrator of NOAA. My experience has, therefore, encompassed a wide range of activities: including fundamental research, applied research, and operations.

In my testimony, I will address three topics: (1) the present status of weather forecasting; (2) special opportunities which now exist for providing, at modest cost, improved forecasts of weather and climate, and the economic importance of such an investment; and (3) the effect on weather services and supporting research of the proposed NOAA budget for FY 83. I will also offer some comments on user fees as a mechanism for reducing outlays for weather services in the federal budget, and on the role of the private sector in providing weather services to industry.

I. Development and Effectiveness of Existing Weather Services.

The ability of the meteorologist to observe and forecast large scale weather phenomena - the occurrence and movement of the cyclones, anticyclones, and fronts that are responsible for the distribution of regional weather - has grown steadily over the last two decades. Weather satellites, polar orbiting and geostationary, have made global weather observation a reality. High speed digital computers, used to simulate the atmosphere, have changed weather forecasting from an art to a science. It is to the credit of the leadership of the National Weather Service that the potential of satellite imagery and numerical simulation was recognized at an early stage in this country: the United States has led the world in the development of both of these important fields of technology application.

More than a decade ago, the nations of the world joined together in the World Weather Program. One part of this program - the World Weather Watch - has been directed toward the development of a Global Observing System and a Global Telecommunication System, coordinated by the World Meteorological Organization, to provide all nations with the information necessary to improve their weather forecasting capabilities. A second part - the Global Atmospheric Research Program (GARP) - has marshalled the best scientific minds of the world to improve our physical understanding of weather and our ability to simulate the atmosphere using high speed digital computers. A primary objective of GARP has been to extend the period of time for which we can make accurate forecasts of the weather. The culmination of the World Weather Watch and of GARP was the Global Weather Experiment: a period of 18 months in 1979 and 1980 during which more than 140 nations cooperated in observing the atmosphere with a comprehensiveness and a level of accuracy never before achieved. The data collected will provide unparalleled material for research during the coming decade; special observational techniques devised for the Experiment (such as drifting buoys and automatic sensors in wide bodied aircraft) may well become an integral part of a future Global Observing System.

The World Weather Program has been an unqualified success. Today, operational weather forecasts made 48 hours in advance are as accurate as forecasts made 24 hours in advance two decades ago. Forecasts made three to four days in advance show substantial skill and are used routinely by many sectors of our society. And the benefits of the World Weather Watch and GARP have not yet been fully achieved. Further improvements of the Global Observing System, now being planned, and further improvements in our physical understanding of the occurrence and causes of weather promise to pay additional dividends in forecast length and accuracy.

Unfortunately, the progress achieved during the last twenty years in improving forecasts of regional weather conditions has not automatically resulted in a comparable improvement in forecasting local weather. All too often, severe or otherwise significant weather is caused by stormscale systems embedded in the larger scale weather patterns. These small scale weather phenomena include tornadoes and downbursts, violent squall lines and thunderstorms, rain induced flash floods and heavy local snows. They also include important non-violent phenomena: freezing rain, dense ground fog, or low-lying clouds which disrupt ground or air traffic; persistent temperature inversions that cause extreme local air pollution; or strong nocturnal cooling which combined with local air drainage may produce killing frosts.

To be useful, predictions of these smaller-scale (often short-lived) events must be far more precise in both space and time than a regional forecast. For example, a warning that a tornado funnel is approaching a specific city must be accurate in time within minutes and in location within a few miles. It is quite possible that such a very short range forecast of severe weather may be missed entirely, even though the regional forecast may be correct in calling for severe thunderstorms (or even the possibility of tornadoes) within a much larger area.

Particularly during the last decade, progress has been made in improving forecasts of local weather phenomena. But much remains to be done. For every instance for which the local forecast and warning system worked well (as in the case of the devastating tornado at Wichita Falls, Texas), there is another example of failure (as in the case of the terrible flash floods at Johnstown, Pennsylvania, or Big Thompson Canyon, Colorado). The fact of the matter is that meteorologists can produce excellent forecasts of regional weather, but they are not yet able to provide, on a regular basis, accurate short range, local weather forecasts. The development of such a capability remains an objective for the future.

II. The Opportunity for and Importance of Improved Weather Services

Continued, steady improvement in our ability to forecast the weather will occur during the next decade, provided this country is willing to make the necessary budgetary investment in our weather services. Improved forecasts would reduce loss of life, destruction of property, and the disruption of social activity which occur as a result of severe weather. They would also reduce the damaging impact of other, less violent types of significant weather, and would provide the information necessary for industry and the public to plan and carry out weather-related activities with greater efficiency.

The benefits to be gained from improved forecasting are significant. The Administration's FY 83 NOAA budget (Page 161) estimates that economic losses to agriculture due to weather-related events amount to $10.6 billion annually. Other industries - commercial and general aviation, land and sea transportation, construction, recreation and others - are equally vulnerable. The total of all weather-related losses in this country is difficult to estimate, but may well reach $20 billion a year. The annual cost of the required improvements to our weather services is substantially less than one percent of this total. And these figures do not take into account either the value of improved weather services to national defense, or the positive effect of improved efficiencies in government, industry, and defense operations.

The greatest and most rapid improvements in weather prediction can be made in short range forecasts of local (stormscale) weather phenomena. Technology exists to observe stormscale weather systems with increasing accuracy; to collect and process the data more quickly and effectively; and to disseminate information directly to the user, all within a matter of minutes. The outlines of a supporting research and development program - directed toward improvements in system design, better understanding of stormscale phenomena, and increased forecast accuracy - are already in place. The two programs - operations and supporting R&D - must continue to be closely coordinated: problems of operational meteorology must be communicated to the research community, and advances in observational capability or fundamental understanding need to be translated into operations.

We begin from a sound base, especially in research. Doppler radar have been developed and tested which have repeatedly proved their extraordinary value in field research programs, such as SESAME or CCOPE. Methods of using remote sensing to observe atmospheric winds are under development. Retrospective studies, some using special data sets collected through carefully planned field research experiments have identified new kinds of small-scale weather systems (such as the MCC - the Mesoscale Convective Complex) or have improved our knowledge of how some severe storms (such as tornadoes) form.

The situation is more constrained when we turn to operations - the attempt to apply in the real world of weather forecasting the new understanding we have fashioned through research and the new technology we have developed. The weather services of the future must be different in some fundamental ways from our present systems. Observational systems must be modernized, to introduce doppler radar and other new techniques; communication systems must be improved, to collect and analyze weather information quickly and effectively; new ways must be fashioned to distribute weather information to industry, the public and government agencies without unnecessary delay. Improved models of weather systems, especially those of smaller geographic scale, must be developed and adapted to operational use. Forecasters must be trained to use the new techniques.

The task that lies ahead is well known to leaders in the weather services of the civil and defense communities. The problem is not identifying what must be done - all of us agree about that. The problem is one of obtaining the necessary resources in a time of stringent budgets and limited federal spending. More than that: the problem today is how to avoid losing ground through the elimination of research services and vital to the long-term improvement of forecast capability; how to convince decision makers that it is economically unsound to spend tens or hundreds of millions of dollars to develop useful technology, and then to abandon the technology with no real effort to apply it to the needs of society; how to convince the Administration and the Congress that there are certain scientific and technical functions - among them the collection, analysis and distribution of basic weather information - which can best be discharged at the national level, rather than by local governments or by the private sector.

It is against these kinds of opportunities - and these kinds of constraints - that the potential impact of the Administration's FY 83 budget must be examined.

III. Weather Services and Supporting Research in FY83.

The NOAA budget for FY83, presented by the Administration, contains reductions in weather services and supporting research which will seriously degrade the ability of the National Weather Service to provide effective forecasts for the user community. The reductions also further delay the introduction of new technology, badly needed for the future improvement of services. I shall concentrate on five items: (A) the request to close 20 part-time and 25 full-time Weather Service Offices; (B) the proposal to downgrade the polar orbiting satellite system; (C) the reductions in specialized weather services (agricultural, fire weather, and fruit frost); (D) reductions in supporting research and development (Weather Modification Research, GARP, and the World Climate Program); and (E) delays in acquisition of new technology (NEXRAD).

A. The request to close 45 Weather Service Offices. The request to close 20 part-time and 25 full-time Weather Service Offices continues the effort of the Administration to reduce the manned observation network on which all weather forecasts are based. The request also negatively impacts the ability of the Weather Service to provide warnings and other essential services in the affected regions.

Over the last ten years the number of employees in the National Weather Service has slowly declined. During the same period, there has been a steady increase in the complexity of our weather systems and in the use of weather information. This has placed more and more demands on the time and energy of Weather Service personnel. In periods of bad weather, personnel at a Weather Service Forecast Office (WSFO) or a Weather Service Office (WSO) operate under substantial pressure. Observations must be taken;

communication systems manned; radar operated and monitored; regional and local forecasts must be made; watches and warnings disseminated to the media; NOAA Weather Radio reports updated - all with clocklike precision.

Closing 45 Weather Service Offices, and transferring their responsibilities to neighboring stations, will increase the pressures; reduce the reaction time available to Weather Service personnel in emergency situations; and generally decrease the reliability and effectiveness of the service. Will the system collapse? Certainly not. Will the service to the public be reduced? Unquestionably. Will the liklihood of a missed forecast of severe weather increase? Almost certainly yes - although this will be very difficult to document.

A fundamental question is: where are we heading? One gains the impression that the station closures are put forward for one purpose only: to reduce appropriations to some arbitrary, pre-determined level. There has been no adequate study of the workload on Weather Service personnel which would indicate that the reductions are programmatically sound. There has been no determination of the optimum number of manned WSFO's and WSO's required to operate an effective weather system. Will future budgets bring additional requests to further reduce the number of manned stations? At what point will we so overload the remaining stations that public welfare and safety will be seriously damaged? We had better consider these questions before we arbitrarily continue to tighten an already overstressed service.

The need for weather observations is recognized by the Administration. Funds are set aside in the budget to negotiate contracts with commercial firms to take observations at the 25 full-time WSO locations. This continues a trend begun under a previous administration: the National Weather Service is relying more and more on observations-by-contract, as its number of personnel and real funding are decreased. Again, where are we heading? What is happening to quality control, when observations are turned over to commercial firms with no long-term, professional commitment to meteorology? What are the costs of contract negotiation and renegotiation? How are the problems of equipment maintenance going to be managed? Are the "savings" overestimated when these factors are taken into account? To my knowledge there are no solid answers to these questions.

I maintain that we should not - must not - gut the effectiveness of the National Weather Service by a series of ad hoc decisions designed solely to reduce appropriations. If we cannot afford the present level of funding for the National Weather Service - a conclusion which I seriously question - then let us develop a plan of action leading to a reconstructed Service which will maximize efficiency and minimize loss of effectiveness. Pending the development of such a road map, let us move with extreme catuion.

B. The Proposal to downgrade the polar orbiting weather satellite system.

The NOAA budget for FY83 proposes a major downgrading of the polar orbiting satellite system. The request is euphemistically labelled "a one polar orbiting satellite system with replacement launches scheduled on eighteen month centers". The brutal fact is that the proposed plan of operation does not guarantee one satellite in orbit; it is entirely possible (even likely!) that during the next several years there will be one or more intervals, of months or even a year or more, during which no polar orbiting weather satellite will be in orbit. Let us see why this is

- and evaluate the consequences.

The compelling reason for a two-satellite system is not the increased data available from the double coverage, valuable as this may be. The primary motivation is the need for an in-orbit back-up. With two satellites in orbit, when one fails the other is still available. When a polar orbiter fails, present operating procedures call for a second weather satellite to be launched as soon as possible. This takes a minimum of three months when an expendable launch vehicle is used; it would take much more than three months with a shuttle launch. If there should be a launch failure, present operating procedures call for a third weather satellite to be launched, and the process continues until two operating satellites are again in orbit. With this type of operational plan, the United States has been able to maintain at least one operating polar-orbiter in space at all times.

Let us examine the operating procedure proposed in the NOAA FY83 budget. The plan calls for "launches every 18 months regardless of the status of the in-orbit satellite". There are now two operating polar-orbiters. One, launched June 27, 1979, has already outlived its expected lifespan; the second, launched August 24, 1981, has been in service a comparatively short time. The launch of the next satellite (NOAA "D") has been scheduled for FY83. Failure of the older of the in-orbit satellites is expected well in advance of the scheduled launch date.

Total interruption of satellite coverage could occur in a variety of ways. Early failure of the second operating polar-orbiter might occur prior to the scheduled launch of NOAA "D", leaving us without an operating satellite. Or, if we were unfortunate, NOAA "D" might fail on launch.

Under the eighteen-month rule, NOAA "E" is not scheduled for launch until late FY84. Thus, even if the second satellite now in orbit lived out its expected lifespan of two years, interruption of coverage could occur for a period of eight to twelve months. A similar situation could occur at any time in the future. And the possibility of launch failure cannot be discounted lightly: NOAA "B" was lost in this way.

It does no good to suggest that a launch might be accelerated if a total interruption of service occurred. The FY83 budget eliminates funds required for satellite acquisition (NOAA "H", "I", and "J") in the amount of almost $25 million; and presumably, the $20 million already appropriated by Congress for this purpose in FY82 will be reprogrammed, since this sum is listed as a "saving". As a result, NOAA "H" will not be available for launch until FY88. The schedule of satellite acquisition is stretched out to such an extent that an accelerated launch schedule - at intervals less than 18 months - is not feasible. If the FY83 budget is approved as submitted, the system is "frozen" for many years in an 18-month launch mode with total interruption of satellite service a constant threat.

What would be the effect of an interruption in polar-orbiting satellite data? These satellites provide information for our operational weather system. In addition to visible and infra-red images of clouds, radiometers are used to determine the vertical distribution of atmospheric temperature. The satellite is used as a platform from which remote surface stations - such as the drifting buoys used in the Global Weather Experiment - are interrogated. The system which accomplishes this, known as ARGOS, was cooperatively developed by France. Beginning with NOAA "E" , the orbiting satellites will carry search-and-rescue instruments to locate downed aircraft or disabled ships. Orbiting satellites will also be used to measure the amount and distribution of ozone, and to monitor the radiation balance of the earth - important for determination of climate change. Finally, the orbiters have a capability known as APT (Automatic Picture Taking). Countries all over the world interrogate our satellite as it passes overhead, and obtain images which show the distribution of clouds and weather over and near their territory. These images are of vital importance to many developing nations, which have only primitive weather observing systems.

Weather satellites have been one of the major successes of the space age. In addition to the value of the satellites to the meteorological and hydrological services of the United States, the orbiters have contributed substantially to world cooperation and stability.

The changes recommended by the Administration result in savings of $185 million over six fical years, from FY82 to FY87 inclusive. This is an average saving of about $30 million per year. This must be compared with the national investment of many billions of dollars annually in our space effort. This is not an attack on the NASA budget: I support a strong and effective space program. However, in my opinion, there is something wrong with the priorities reflected in our national budget when billions are spent for research and development - and the only operational, earth-viewing satellite system in the civil space program can be sacrificed to save a comparatively inconsequential sum. This country must be willing to capitalize on and reap the benefits of our R & D program. We cannot afford to let research and development become an end in itself.

Finally, I must remind this Subcommittee that there is a way to effect substantial savings in the weather satellite program without damaging its fundamental character. The Executive Branch has for many years mandated the policy that weather satellites must be launched by the Shuttle once it becomes available, instead of by an expendable vehicle. The capacity of the Shuttle is far in excess of that required to carry weather satellites into orbit; in addition, present Shuttle capability is limited with regard to flight elevation, and a booster rocket must be used on the Shuttle to place the weather satellite in polar orbit. As a result of these and other factors, cost estimates for a Shuttle launch have been growing rapidly, and over the next decade will contribute substantially to program expenditures. These launch costs are in addition to expenditures necessary to redesign the NOAA spacecraft for Shuttle use.

The polar-orbiting weather satellite program has been caught in a Catch-22 situation. The policy requiring Shuttle launch is established; program costs rise rapidly, in part due to this policy decision; the Executive Branch becomes concerned about escalating costs; and finally, essential parts of the program are proposed for deletion, thus giving the policy of Shuttle launch priority over the substance of the program it was originally supposed to support.

Perhaps it is time to consider the option of relaxing the requirement of Shuttle launch for meteorological and other small scientific satellites. A reversal of policy may or may not be desirable: the decision involves factors which extend far beyond the boundaries of the weather satellite program itself. I shall not, therefore, make any recommendation. I can only note that from the perspective of the atmospheric scientist, the process of priority setting seems to be distorted. Clearly, the meteorologist would prefer a sound weather satellite program, which uses expendable launch vehicles, to a skeletal satellite program which uses the Shuttle.

C. Reductions in Specialized Weather Services. The NOAA FY83 budget proposes to eliminate Fruit Frost Forecasts; it also seeks to reduce the Fire Weather and the Agricultural Weather Programs.

The Fruit Frost Forecast program is a cost-effective, important activity. It is not essential, however, that this program remain within the federal government. Satisfactory service to this user community can be provided by private meteorology consulting firms. There are three possible ways in which Fruit Frost Forecasts can be provided: (1) the service can be provided by the government, without user fees, as has been done in the past; (2) the service can be provided by the government, but user fees can be assessed to offset costs; and (3) the service can be provided by the private meteorological sector. In proposing the third alternative, the Administration is seeking to divest itself of an activity which it apparently believes should be carried out in the private sector. I cannot take exception to this conclusion. Most other industries -- such as construction -- obtain their forecast services from private meteorology firms.

The situation relative to Fire Weather Forecasts is less clear. In this case the primary users of the forecasts are the various levels of government: federal, state and local. So many different geographic areas are involved, so many levels of government, so many different agencies within government, that a very good case can be made that the responsibility for Fire Weather Forecasts must be centralized. Within the federal government, each agency would go its own way in its effort to obtain the meteorological information which it requires. The resulting development of enclaves of weather-oriented employees -- sub-critical in size and without adequate professional supervision -- would not only be inefficient, but also expensive. Phasing out the Fire Weather Service would reverse a federal policy that has been accepted for many years, by both Democratic and Republican administrations: that the National Weather Service should provide meteorological services to other federal agencies, as needed.

The additional reductions proposed for Agricultural Weather Services are also difficult to understand. The National Weather Service has always provided forecasts for the public. Due to the large number of individual farmers with small land holdings, agricultural weather services have historically been considered to be different from services to other industries. One could, of course, argue that this preferential treatment is no longer appropriate. However, such an argument would be difficult to sustain — factually or politically. In these stressful times it might be reasonable to suppose that an undertaking to change the status-quo would be attractive only if the service involved were ineffective and inefficient.

This is not true of NOAA's Agricultural Weather Services. The Administration's budget for NOAA for FY83 estimates (page 161) that there is a "return of $30 to $100 in crop and livestock savings for every dollar spent on the program". This is a highly cost-effective program: one which must more than pay for itself in terms of increased tax revenues alone. The proposed reductions would appear to be counterproductive.

D. Reductions in supporting research and development. Three proposed reductions in funds, for the following programs, are considered: Weather Modification Research, Global Weather Experiment (referred to in the budget as the First GARP Global Experiment), and World Climate Program.

Modern, scientific efforts to modify the weather have been undertaken for more than 30 years. They date back to the late 1940's, when Dr. Irving Langmuir (an American Nobel laureate) first demonstrated that supercooled water droplets in clouds could be crystallized and the clouds could be modified by the addition of certain chemical substances. Since that time, substantial progress has been made in gaining understanding of the physical properties of clouds and the dynamics of their formation and growth. Many possible ways to modify weather have been analyzed -- most importantly, the possibility of augmenting precipitation by intervening in the normal sequence of cloud evolution. Many countries of the world, including the United States, have operational precipitation-augmentation programs which seek to increase water supplies or crop production. It is quite possible (some would say "almost certain") that these programs actually increase precipitation to some extent; unfortunately, the variability of precipitation is so great that it is difficult to prove that this is actually true.

It is unlikely that Weather Modification Research will lead to an early "breakthrough" which will enable us to modify the weather to a substantial, known degree. However, given the world's need for food and the impact of severe weather on society, it is in my opinion imperative for the United States to have a modest, carefully structured research program in Weather Modification. Furthermore, it is not sufficient for this program to be entirely oriented toward fundamental research (such as might be conducted under the auspices of the National Science Foundation). Applied programs of research involving field investigations are an absolute necessity. NOAA's aircraft, and its operational and field orientation, make NOAA an important part of a national, long-term weather modification research program.

It would be extremely unfortunate if NOAA's research program in weather modification were emasculated. However, not all parts of the program are equally important. In particular, the effort to modify tropical hurricanes (Project Stormfury) is probably expendable at this time. However, it may be important to revive this program at some future date, when our knowledge of cloud physics and the dynamics of hurricanes is more advanced.

The research programs related to the Global Weather Experiment (GWE) and the World Climate Program (WCP) are also fundamental to the continued development of meteorology as a science. Many millions of dollars have been spent on the Global Weather Experiment. It has already been noted that the data collected during the Experiment will provide material for research for a decade, and that special techniques developed for the Experiment point the way to further improvements in the Global Observing System. If research funds available to NOAA for the Global Weather Experiment are sharply reduced, the capability of the United States to capitalize on the investment it has made will be severely limited. True, fundamental research using GWE data will continue to be funded by NSF. But NOAA's mission in applied research and development is also essential to an effective program. For example, further development is required if we are to bring to operational use new techniques of observation (such as drifting buoys and automatic sensors in aircraft), employed so successfully on an experimental basis in the Global Weather Experiment. This is one of the areas targeted for reduction in the FY83 budget.

In another arena, this country is just beginning to put together a successful Climate Program in response to the National Climate Program Act passed by Congress in 1978. Effective participation by this country in the World Climate Program will be handicapped by the proposed 70% reduction in research funds — and also by the termination of the FY82 Climate Data Base Initiative.

Research and development in NOAA has taken more than its "fair share" of reductions in the FY83 budget. I hope I am wrong, but I think I detect a tendency for the Administration to think of NOAA as a service-oriented, operational agency which has no need for R&D. The oft-repeated hope that some of the eliminated programs might be picked up by NSF may indicate a lack of appreciation of the importance of applied research and development, areas in which NOAA's contribution is especially important. No R&D program can be effective without close working relations between fundamental research, applied research, development, and operations. The present budget moves in the direction of reducing, rather than enhancing, working partnerships that have been forged with great difficulty over a period of years.

E. Delays in acquisition of new technology (NEXRAD). I have discussed earlier the tremendous importance of bringing new, proven technology "on line" in NOAA operations. The sad state of our operational weather radar is a case well worth noting.

NOAA's present operational radar system is built around the WSR-57 — a radar set designed in 1957 and now hopelessly out of date. The operational radars cannot make quantitative measurements of cloud reflectivity (needed for severe storm detection); they also cannot make doppler measurements of cloud motions (needed for tornado forecasting and detection, as well as for other purposes).

Modern radar with these capabilities have been built and thoroughly tested by NOAA, NASA, DOD, and several universities. We know what our operational system needs — and must have, if severe storm forecasting is to be improved. NOAA, DOD and the FAA have been working together on a joint procurement — which would add materially not only to our weather forecasting capability, but also to aircraft safety and national defense. No objective study can fail to identify the importance and cost-effective nature of this program (NEXRAD).

Yet the FY83 budget calls for another "stretch-out", another delay. The NOAA budget shows only a $1 million reduction in a $20 million total appropriation for radar -- which does not sound too bad. But the $20 million includes the full costs of staffing and operating the existing National Weather Radar Network. The impact on the NEXRAD program is much more substantial, amounting to a 20% or 25% cut from a level which has aleady been reduced several times. The net effect is that the NEXRAD Program would not be implemented until 1994 or 1995 -- more than a decade from now.

How long can the federal government afford to wait to reap the benefit of new technology developed at substantial cost by our scientists and engineers? Industry will not wait; the technology by now is well known.

Will we export doppler radar to the rest of the world years before a modern system is operational in our own country? Will we force the Department of Defense to "go it alone" because it eventually will be unable to wait for the Executive Branch to decide that the civil community (represented by NOAA and FAA) have equally pressing needs? These are questions which Congress may find it appropriate to address.

D. Comments on Some Policy Issues: Concluding Remarks

Some critical policy issues have been presented in the preceeding discussion. Other issues must also be considered.

The meteorological community is very close to a consensus concerning the appropriate role in weather services and supporting research of the federal government, compared to local government and the private sector. Most meteorologists would agree that the federal government should observe, collect, analyze, and distribute weather and climate information; should issue watches and warnings of severe weather; should issue general weather forecasts to the public; and should undertake programs of fundamental research, as well as applied research and development necessary to the federal operational mission. Most would also agree that the federal government should not provide services to specific industries or specific corporations, except in special cases where public welfare or public safety is directly involved (such as in aviation).

The present Administration has employed user fees to reduce the cost of weather services to the federal government. In some cases this may have a positive effect -- provided, of course, we move slowly enough to permit the necessary adjustments to take place. There are special problems, however, when the users are other federal agencies. The distribution among several agencies of appropriations necessary to support a single program will diffuse authority to make operational decisions within the Executive Branch and will complicate appropriation and oversight procedures in Congress.

It is easy to overestimate the importance of assessing fees to non-federal, industrial users. Only a small fraction of the total cost of weather services and supporting research can be recaptured in this way. A much more substantial amount of money could be realized if user fees were charged to the general public for certain types of special services. However, this possibility raises an entirely new set of complications which I shall not discuss at this time.

Several policy issues relate to priorities. I have already made the point that the Administration's priority balance in the space program, as reflected in the FY83 budget, shows a willingness to spend large amounts for R&D coupled with an unwillingness to reap the benefits of past R&D programs by support of operational missions, such as NOAA's polar orbiters. On the other hand, there is another priority balance which must be considered: the balance within the NOAA budget between satellite programs and other important activities. Within the NOAA budget, satellites have been given very special treatment indeed, compared to other services (e.g. Agricultural Weather Services) or supporting research (e.g. Weather Modification Research, GARP, or the WCP).

Finally, I must once more emphasize the point that "reducing the budget" is more an objective than a policy. We must have policies which permit decisions -- no, mandate decisions -- which are in the best long-term interest of our country. Destroying research and development programs which are designed to produce long-term gains and advantages may in the short run help reduce budget deficits, but it will not in the long run build a stronger program of science and technology. Similarly, deferring or eliminating operational or procurement expenditures may reduce outlays now, but may in years to come cause inefficiencies and ineffectiveness in our weather services. I fully understand the tremendous pressures on the Administration and Congress to reduce the federal deficit for FY83. But I am forced to say that in my opinion the Administration's budget reflects too much of the "save now, pay later" point of view.

Thank you, Mr. Chairman, for the opportunity to appear before the Subcommittee.

Mr. SCHEUER. Thank you very much, Dr. Benton, for your excellent testimony.

Dr. Suomi?

STATEMENT OF DR. VERNER E. SUOMI, UNIVERSITY OF WISCONSIN

Dr. SUOMI. Thank you, Mr. Chairman.

Mr. SCHEUER. I hope that your combined remarks and the slide show will not go too far over 6 or 7 minutes.

Dr. SUOMI. Well, I will shorten it considerably because I have been aided in some respects by Congressman Sensenbrenner.

Congressman Sensenbrenner has already given part of my talk. However, he forgot to mention that while it is possible to give excellent forecasts of large-scale storms such as the winter storms we endured in Wisconsin, the same is not true for small-scale storms. The same storm has imbedded in it small-scale features like snow squalls, ice, and so on, and in the summer the squall line, the severe thunderstorm, and tornado are imperfectly predicted at present. The actual area affected by the severe condition is usually small, and people in a much larger area must be warned. Citizens who are not actually affected by the severe weather do not want their activity interrupted by storm warnings. However, they may be useful to the person in the next county.

The slide I was going to show indicated that the new stationary satellite equipped with the new sounder was really able to pinpoint the activity much more than is possible at present. In order to improve these forecasts on short time scales and small space scales we must have frequent and detailed data. The results I would have shown you showed that the NOAA team working at the University of Wisconsin has enabled us to get very tight observations.

The large reduction in the cooperative efforts between NOAA and the universities that is proposed would be absolutely devastating to this program. It is being reduced to about only one-third of its accustomed level. Mr. Chairman, I hope you and your subcommittee will give high priority in the deliberations to correcting this situation.

We have heard a lot about user fees. I cannot provide you any information on appropriate user fees. However, I know from my own research that if the costs are high and the time delay is too long, the value of the data drops dramatically. Where this happens, the researcher simply picks up another subject. My guess is the same thing happens to the potentially useful information in the private sector. A potential client or a potential service is lost.

The level of user fees and the prompt availability of data and information that industry needs will have a large impact on the proper relations between Government and industry in providing specialized weather service. There is, as others have stated here, a universal consensus that collecting the basic weather data and issuing forecast information vital to the public safety are proper roles for the Government. Beyond that, the private sector can provide special weather services much more satisfactorily.

The private meteorologist knows the specific need of the specialized user. More importantly, both the provider and customer necessarily agree on the value of the information and the market price that must be paid for it. Our present delivery system of weather information can be vastly improved and I sincerely believe the cost to the taxpayer can be lowered.

It is possible that with new data systems available, using small computers, weather displays, the private sector activities can expand significantly, more than they have in the recent past. If that happens the increase of taxes in the private sector could pay for some of the public sector cost. The discussion of new opportunities for making more effective use of facilities might convince you of these exciting opportunities in the future.

Because I have worked with satellites since they were first introduced in the 1960's, I naturally view satellites as the key to the future of better weather services, both public and private. Important weather data can be collected quickly from the entire globe with low-altitude satellites in Sun-synchronous orbit. Moreover, continuous surveillance of severe weather is now possible using geosynchronous satellites such as the GOES series. What has not been done so far is to use the satellite communication capabilities to deliver this valuable information in time to be of greatest value.

I have some slides which show the system which was introduced in Kansas City, pretty largely as the result of members of the parent committee, and this is now available and working. On the other hand, the new, high-performance geosynchronous satellite whose results I would have shown you is not without some important limitations. It cannot see through clouds, and some of the important storms such as hurricanes have extensive cloud cover. Also, there are times in winter when much of the United States is completely covered with clouds, although the new satellite works well if there are any holes. In these situations we need the microwave sounding capability now carried by the low-orbiting weather satellites such as those of the TIROS-N and NOAA series. I would have shown you the powers of these systems, and they are very great indeed, particularly on the location of the center of the hurricane which in itself is largely cloud-covered.

[The prepared statement of Dr. Suomi follows:]

02/23/82

Statement by Verner E. Suomi
Professor and Director--Space Science and Engineering Center
University of Wisconsin, Madison, Wisconsin

to

Subcommittee on Natural Resources
Agricultural Research and Environment

Thank you Chairman Scheuer for inviting me to appear before your subcommittee to tell you about the effects of the proposed budget cuts on our weather services.

I propose to follow the questions outlined in your letter and to illustrate my points with specific examples.

The answer to your first question on the state-of-the-art of weather forecasting, the needs, and opportunities will be clearer if I first clarify what we mean by weather. It means different things to different people. Then I will tell you about what is being done in both operations and research relating to weather.

Next I will illustrate the effects of budget cuts on weather services and atmospheric research and on the cooperative efforts in research with the universities, again with a specific example.

I will not dwell at length on the level of user fees, except to show that when the costs are too high and the delivery too slow the utility of data is lost.

Finally, I will address your last two questions on the role of the private sector in providing specialized services and the improved use of research facilities and satellites together since the answer to the first bears heavily on what is done on the last.

How predictable is the weather? That depends dramatically on the scale of the storm, how large it is, and how long it lasts. During January, we in Wisconsin were provided with superb forecasts on large and especially severe winter storms. These storms first brought us heavy snow, then bitter bone-chilling winds. We received a full two days ahead accurate forecasts of the January 3 and 4 storms that closed schools and brought many activities to a halt. A two-day lead time was also provided on the 10th, and again on the 17th of January. These storms brought record-breaking temperatures and wind-chill factors near 70° below zero. The skill in forecasting these large storms is excellent. It is difficult to estimate the dollar benefit of these forecasts, but the life-saving benefits are obvious. The high degree of skill illustrated by these excellent two-day forecasts of large-scale weather in January in Wisconsin should improve still further in the future. Research results both here and abroad show that it is possible to provide excellent forecasts out to 6 days and useful information out to 10. Forecasting of large-scale weather systems is now a science, not an art.

The ability to forecast smaller effects within a large storm, such as the exact position of the snow swath or edge of the freezing rain is not as high. In Wisconsin, restaurant owners became unhappy when snow warnings stop traffic and cause citizens to stay home, only to find that the storm is less severe in their own neighborhoods. The same storm may be much more severe a few miles away, but that does not make the restaurant owner any happier. The difficulties of forecasting become much greater as the storm elements become smaller and more intense. For example, squall line weather, severe thunderstorms, and tornadoes are imperfectly predicted at present. Although the actual area affected by severe conditions is usually small, people in a much larger area must be warned. Citizens who are not actually affected by severe weather do not want their usual activity interrupted by storm warnings, however useful they may be to the folks in the next county.

I can illustrate this point by showing some slides of the July 20 tornado near St. Louis. The first slide shows a tornado warning box issued by the Kansas City Severe Weather Forecast Center on last July 20. You can see strong convective storms in eastern Kansas as well as central and eastern Missouri. The next slide is the same image, but superimposed is the water vapor field obtained from the new VAS Synchronous Satellite that gives temperature and moisture fields as well as visible and infrared images. We see that the storms over eastern Kansas are in a dry zone and should weaken, whereas the storms in eastern Missouri are in a very moist zone and should intensify. The next slide one hour later shows that this did happen, and the intense storms near St. Louis produced several tornadoes.

In order to improve forecasts on these short time scales and small space scales, we must have much more frequent and detailed data. I will next describe how these data can be obtained and I will return to this issue when I discuss your last question.

The results you just saw are just one of many research results obtained by a NOAA team in the Satellite Development Laboratory under Dr. William Smith stationed at the University of Wisconsin. In my view, this is an example of NOAA-University cooperation at its finest. However, I understand that the proposed budget cuts for R&D within NOAA itself and for its cooperative efforts with universities are especially severe, possibly reducing the program to only a third of its accustomed level. This large reduction would be absolutely devastating to present programs. Mr. Chairman, I hope that your subcommittee will give a high priority in your deliberations to correcting this situation.

Turning to another of your questions, I cannot provide any detailed information on appropriate user fees. However, I know from my own research experience that if the costs are too high and the time delays too long, the value of the data to the user drops dramatically. Where this happens, the researcher simply picks another subject. My guess is that when the same thing happens to potentially useful information in the private sector, a potential client is lost.

The level of user fees and the prompt availability of data and information that industry needs will have a large impact on the proper relationships between government and industry in providing specialized weather services. There is a universal consensus that collecting basic weather data and issuing forecast information vital to the public safety are proper roles for the government. Beyond that, the private sector can provide specialized weather services much more satisfactorily. The private meteorologist knows the specific needs of the specialized user. More importantly, both the provider and the customer necessarily agree on the value of the information and the market price to be paid for it. Our present delivery system of weather information can be vastly improved, and I sincerely believe costs to the taxpayer can be lowered. It is possible that, with the new data systems available using small computers and weather display systems, the private sector activities will expand significantly. If that happens, the increased collection of taxes on the added private-sector income could pay for the public-sector costs. A discussion of the new opportunities for making more effective use of research facilities and satellites might convince you of these exciting opportunities for better and less costly services.

Since I have been working with satellites since they were first introduced in the 60's, I naturally view satellites as the key to the future of better weather services, both public and private. Important weather data can be collected quickly from the entire globe with a low altitude satellite in sun synchronous orbit. Moreover, continuous surveillance of severe weather is now possible using geosynchronous satellites such as the GOES series. What has not been done so far is to use satellite communication capabilities to deliver this valuable information in time to be of the greatest value.

Before I tell you how we might accelerate the flow of this useful information, I would first like to show you an example of what is possible. Earlier I showed how tornado forecasts could be pinpointed in accuracy by making better use of the satellite data we already have. In order to give you a still better appreciation of what is possible, let me show you a few more slides from that example. The next slide shows the moisture field for that same time extracted using the new VAS temperature and moisture sounder. The lines are from the VAS. Superimposed on this data are the positions of the regular radiosonde stations that provide data twice a day at 6:00 a.m. and 6:00 p.m. local time. Note their broad spacing: In the United States we obtain less than 100 radiosonde soundings twice a day. The next slide shows the individual satellite soundings that were used to make up the detailed moisture field. Here we have from the satellite more than 300 soundings for only part of the United States, and these are available once an hour!

Moreover, all this information is made available in less than a 1/2 hour from the time the satellite sends the data. Obviously this is a dramatic improvement for severe weather forecasting.

The new high performance geosynchronous satellite whose results I have just shown you is not without some important limitations. It cannot see through clouds, and some types of important storms such as hurricanes have extensive cloud cover. Also, there are times in winter when much of the United States is completely covered with clouds (although VAS works well in any holes). In these situations, we need the microwave sounding capability now carried by the low orbiting weather satellites such as those of the TIROS-N and NOAA series. The next few slides will show the power of these systems. The first slide illustrates using color shading the warm temperature field of a hurricane obtained through the clouds. An analysis of this temperature field, called the Laplacian, is superimposed as lines on the image. You can see the circular lines which locate the hurricane. The temperature within the hurricane determines its central pressure: The warmer it is the more intense the storm. Knowledge of the pressure field allows one to determine the wind field. The next few slides show comparisons between satellite-derived information for hurricanes Irene and Harvey and comparison wind and pressure observations obtained by National Hurricane Service airplanes. From these results, a strong case can be made for saving the risk and the cost of hurricane reconnaissance flight.

NOAA's new budget calls for eliminating one polar-orbiting weather satellite from the present fleet. Obviously, when the one in orbit fails, we will have none, and there will be an extended gap until a replacement satellite is launched. Thus, we could be without the powerful microwave sounding capability during winter or during the hurricane season when it is urgently needed. Studies now show that it is also possible to equip a geosynchronous satellite--even a spin-stabilized spacecraft such as our present ones--with a microwave sounding capability. In my view, we should retain the present system of two low-altitude orbiting weather satellites until the microwave capability is added to the geosynchronous spacecraft.

Finally, I want to make a point on the availability of this valuable new data--whether from space or conventional sources. At present the GOES data is delayed a 1/2 hour after observation due to the need to record the whole earth image, sectorize it and transmit it to the users. This precious data would be much, much more valuable if it could be made available to all users in real time. An example of how this is being provided in an experimental mode is shown in the next few slides. The first is an illustration of a new antenna on the Federal Building in Kansas City. This antenna allows the severe weather forecast center to receive satellite data without any delays whatever. The next slide shows the McIDAS system installation at Kansas City only two weeks ago.

This installation was made possible by the interest and influence of Congressmen Fuqua, Flippo, and Wynn; and the cooperation of NASA with NOAA in supporting this work. Thanks to this concerted action by the legislative and executive branches of government, our national severe weather warning service now has at last all the data it needs displayed on a television screen in real time. It does not take too much imagination to see that this same TV data display or one like it could be relayed over the whole country to a wide variety of users using a commercial satellite TV link. Cable services could distribute such data in cities, and farmers could use the new economical satellite TV receiving systems. If some of the data were sent digitally, it could also form the basic set for commercial users.

Mr. Chairman, the opportunities for markedly improved weather services are great, and thanks to new technological developments the costs can lower dramatically. Now is not the time to cut back on this opportunity, only to let the Japanese, Europeans and maybe even the Chinese reap the large benefits of the hard and dedicated work by many researchers within and outside of the government.

Mr. Chairman, I have tried to show you that prediction of large-scale storms is in good order, but important further improvements are possible, For example, we must continue to support the Global Weather Experiment's research program and to reduce its findings to operational practice.

Prediction of smaller scale weather is more difficult and is limited at present mainly by too infrequent and too widely spaced radiosonde observations. I showed examples where the new VAS satellite can improve the situation by more than an order of magnitude, and where research results in an operational environment show very encouraging promise. These promising results were obtained by cooperative research efforts between NOAA and the university community, yet this portion of the NOAA budget is in the greatest jeopardy of all.

There is now a virtually universal consensus that the collection of the basic data and the issuance of public safety weather forecasts are proper roles for the federal government. However, the private sector is probably in a better position to provide specialized weather forecasts and services. The range of these specialized services can expand significantly if the private sector is provided with prompt and ready access to the data base at reasonable cost. Use of a satellite communication channel in the TV band can make this possible.

Weather information has reached the stage where it is a valuable economic resource, and not only a warning against an occasional hazard, as important as that function may be. I hope, Mr. Chairman, that you and your subcommittee can take steps to improve the security of funding for both the near and future NOAA programs. I am especially concerned about proposed plans to have a zero insurance situation on the polar-orbiting satellite when its microwave sounder is so vital for hurricanes and extended cloud cover over the United States in winter.

Thank you for listening.

Mr. SCHEUER. Dr. Suomi?

Dr. SUOMI. Yes?

Mr. SCHEUER. We really have run out of time for this panel. I regret it very much because all three of you have had a great deal to say and you have said it very, very well. How long would your slides take?

Dr. SUOMI. I think we can dispense with them——

Mr. SCHEUER. OK.

Dr. SUOMI [continuing]. Although they would be something for you to see.

Mr. SCHEUER. Yes. Let me say that we simply do not have time for questions. I am terribly sorry. We will submit a great many questions to you in writing, as a result of your written testimony and your oral testimony, so we are going to leave the record open for those questions. We hope you will get them back to us as soon as you conveniently can because we may have some followup questions that we will also submit to you in writing. I am terribly frustrated because the clock is running, and I hate to be in the position of not asking you questions when your testimony has been so thoughtful and has raised so many interesting public policy questions.

George, do you have any questions?

Mr. BROWN. No questions.

Mr. SCHEUER. With that, I thank you for coming here. You can expect to get questions from several of us in the mail. Thank you very much.

Now we will hear from Dr. Paul Maughan of Comsat.

Dr. Maughan, you have heard the painful position that we are in. We are terribly short of time. Your testimony will be printed in full at the appropriate point in the record, so perhaps you could sum it up in 5 or 6 minutes and then I am sure Congressman Brown and I will have some questions for you.

STATEMENT OF DR. PAUL M. MAUGHAN, DIRECTOR, EARTHSTAR PROGRAM, COMSAT

Dr. MAUGHAN. Thank you, Mr. Chairman.

I believe the substance of my remarks is contained in five points: First, the weather services referred to by the previous distinguished witnesses, for which there is apparently an outspoken demand, are largely available today because of the technology base, including satellite remote sensing, built into the U.S. weather system. Whereas weather satellites have led the way, land remote sensing is just now coming of age.

Second, there are clouds on the remote sensing horizon. Budget reductions, strong foreign interest, and even apathy toward advanced technologies are all threatening to essentially say to our foreign competitors, "Here: We paid for this technology. Now you develop it commercially and sell it back to us as well as to the rest of the world." I am appalled—no, I am furious—that this might happen.

Third, although we are near the 11th hour, it is still not too late to turn this situation around. I believe the key is a bold, innovative commercial approach to provide needed environmental remote sensing satellite data and services, including weather, land, and even ocean data. Now is the time to take advantage of the technical, financial, and market development expertise and—I believe of extreme importance—motivation by private industry to not only continue providing those services to the Government which the Government needs to accomplish its mandate but expand the offering to include and incorporate new technologies that will enhance the data.

Fourth, the vehicle I offer you to do all this is described in the Communications Satellite Corporation's—COMSAT's—proposal for a weather and land remote sensing satellite service we call EARTHSTAR. Our proposal, which I have outlined in the paper delivered to the committee, essentially would provide the Government more data than the Government currently provides itself, and at a cost which is substantially less than projected outlays.

COMSAT is prepared to acquire the Governments GOES, NOAA, and LANDSAT satellites and related ground equipment for a fair price, and make a substantial investment in upgrading the system. We would acquire and integrate these three programs and related sizeable overhead structures into a single, unified system and make the necessary additional investments on the basis of a long-term Government commitment to procure data from us and—of extreme importance—on the basis of the expected development of commercial markets. Thus, we would reduce costs while at the same time expand the business base.

Finally, what is needed to launch EARTHSTAR into orbit is a Government policy to transfer the existing weather and land satellite systems to the private sector, and then through legislation designate COMSAT to assume the responsibility for developing and operating the combined system. COMSAT is uniquely qualified to carry out the EARTHSTAR program, based on our charter and our proven record of performance in establishing commercial communications services. We are ready and eager to proceed. I would be happy to answer any of the committee's questions.

Thank you.

[The prepared statement of Dr. Maughan follows:]

Statement
of
Dr. Paul M. Maughan

INTRODUCTION

Mr. Chairman, I am pleased to appear before you today to describe COMSAT's proposal for a combined civil meteorological and land remote sensing satellite service, called EARTHSTAR, and the role COMSAT is prepared to play in providing environmental satellite data in support of an effective weather service. Although you have asked us to particularly emphasize the parts of our proposal relating to the civilian meteorological satellites, we think that the land observation satellites and meteorological satellites should be viewed as an integrated earth environmental monitoring system and should therefore be considered together.

Basis for EARTHSTAR

- Budget restrictions are forcing the Government to reduce the data and services provided by meteorological and land remote sensing satellite systems.
- Other nations are aggressively seeking to develop and exploit the international remote sensing market and to wrest leadership from the United States.
- Private sector expertise is needed to develop a remote sensing business which would be competitive with foreign systems and preserve U.S. leadership in this important application of space technology.

- COMSAT proposes to develop a commercial remote sensing satellite system, called EARTHSTAR, which would provide the Government with a full satellite data service at a cost which is substantially less than projected Government outlays and which would effectively compete with foreign systems. Substantial savings in the budget for remote sensing programs could enable the Government to redirect funds to other programs.
- The development of a commercial remote sensing satellite system requires the establishment of a policy for the transfer of the existing government civil remote sensing systems to the private sector.
- The most expeditious means of implementing such a policy would be to designate by legislation an appropriate private entity with a proven record of performance, both domestically and internationally, to assume the responsibility for operation of an integrated civil remote sensing system and the evolution of an international system.
- We think COMSAT is uniquely qualified to be so designated based on its long and successful experience in the establishment and operation of many satellite systems and its unique established

relationships with and responsibilities to the President and the Congress.

Impact of Budget Restrictions

Current budget pressures threaten the continuity of the present U.S. civil remote sensing satellite programs. NOAA has proposed in its FY83 budget the termination of one polar-orbiting meteorological satellite, and there is apparently some consideration being given to reducing the GOES coverage from a two oceans view to a single ocean view. Furthermore, land remote sensing is scheduled to be discontinued after LANDSAT D prime and the operation of LANDSAT D prime may also be impacted by budget pressures. This decline in the U.S. program is occurring at a time when foreign efforts in this area are intensifying.

Foreign Competition

There is no question that the United States is faced with increasing competition from other nations to develop commercial remote sensing systems. France, Japan, the European Space Agency (ESA), Canada, and Germany are embarking upon ambitious remote sensing programs as a means of developing and promoting their aerospace and related industries required for data acquisition and processing, interpretation, and distribution. The French have begun construction of the SPOT satellite which they plan to launch in early 1984. Of particular value to petroleum and mineral exploration interests, its high resolution, stereoscopic data will be sold through a commercial entity specifically created by the French government to aggressively develop the commercial market for SPOT products worldwide.

The Japanese Ministry of Industry and Trade and ESA have also announced plans to build satellites which would include a high resolution stereoscopic sensor, as well as a synthetic aperture radar to measure sea state phenomena of importance to fishing harvests, ocean mining and shipping operations.

Canada has announced plans to launch Radarsat, an all weather high resolution synthetic aperture radar satellite whose data will be used principally for promoting exploration and development of resources in Canada's Northern and Arctic regions. Germany has also announced plans for an all weather high resolution radar satellite of interest to resource managers and developers.

If the United States does not continue to develop and apply its civilian remote sensing technology, there will of necessity be an increasing dependence on foreign suppliers for essential information about the earth, its resources, and environment. Thus, users of remotely sensed data in the United States, including Government agencies, may have no choice but to become customers of foreign suppliers. Instead of being an exporter of remote sensing information products, services and hardware, the United States would become an importer of such information products and services with resulting adverse effects on the balance of trade.

Under a private sector owner/operator, the commercialization of civilian remote sensing services would be accelerated and new sensors, data products, and services introduced, thereby assuring that the United States leadership in commercial space applications would not only be preserved but significantly enhanced.

COMSAT Proposal

COMSAT is prepared to assume the responsibility for developing and operating a combined meteorological and land commercial remote sensing satellite system which would meet, in an efficient and economical manner, the data needs of the Government and other users and which would preserve U.S. leadership in remote sensing technology and data availability against growing competition from Europe and Japan.

Under the provisions of its EARTHSTAR proposal, COMSAT is prepared to acquire the Government's GOES, NOAA, and LANDSAT satellites and related equipment and facilities for a fair price and make a substantial investment in upgraded satellites and facilities over a ten-year period. COMSAT would develop an integrated commercial civilian remote sensing satellite system. COMSAT would acquire these satellites and make the necessary additional investment on the basis of a long term Government commitment to procure satellite data and services from COMSAT and the expected development of the commercial markets. Our studies indicate significant latent demand for commercial services that can be developed around the increasing sophistication and availability of receive and processing equipment (at steadily declining prices), the maturation of interpretive techniques, the growing pool of skilled manpower, and the expected improvements in sensor resolution and discrimination. Our projections indicate that we could supply the Government with more data at less cost than if the Government continued to operate remote sensing satellite programs.

The proposed EARTHSTAR system would be composed of in-orbit geosynchronous and polar-orbiting satellites which would collect information relating to the earth, including its land, water and atmosphere, by means of passive and active sensors. The satellites would be monitored and controlled by a central satellite control facility, and information obtained by the remote sensing satellites would be transmitted as digital data to COMSAT ground station facilities. The data would be edited, corrected, and formatted by COMSAT into basic data products suitable for further use, processing, analysis, and interpretation by users, including the Government and companies providing specialized value-added analysis and interpretation.

COMSAT would begin to provide the Government and other users with meteorological and land satellite data during 1983 when the GOES, NOAA, and LANDSAT satellites and selected associated ground facilities are acquired and operational control is transferred to COMSAT. Initially, COMSAT will relocate selected satellite control and data processing equipment so that it can be consolidated with COMSAT's existing facilities. Thus, existing NASA and NOAA facilities would be freed to allow these agencies to perform other functions.

Weather data would be obtained by the GOES geosynchronous satellites located over the Atlantic and Pacific Oceans and by the NOAA sun-synchronous satellites which provide morning and evening coverage. COMSAT would supply the National Weather Service (NWS) and other Government agencies with the weather data products which are needed for the preparation of weather forecasts, advisories, warnings, and for other existing public uses. The NWS could continue to disseminate the weather satellite data and enhancements to the public and to foreign weather organizations through the existing weather data dissemination networks. In addition, COMSAT would make the weather data products available to other users and value-adding companies which desire to acquire data directly from COMSAT under commercial terms and conditions. The growth of private meteorological service capabilities, the exploding demand for improved weather data for television programming and the emergence of specialty services for agriculture, transportation, offshore services, and others underscores our belief that these markets would respond to a commercial service.

COMSAT would continue to provide the existing direct readout, satellite data distribution, and environmental data collection services to the Government. Environmental data relay services also would be made available to non-Government users on a commercial basis.

Land data products would be produced from information obtained from the sun-synchronous LANDSAT 2, 3 and D satellites. Beginning in 1986, new high resolution land stereoscopic satellite data product would be made available with the launch of a new stereo sensor which COMSAT would incorporate into the LANDSAT D prime bus.

COMSAT would provide land data products to the Government for its internal use. These data products also would be made available, under commercial terms and conditions, to non-Government users and value-adding companies. Foreign direct readout of land satellite data would be continued under revised commercial arrangements negotiated with appropriate oversight by the Government.

Development of other new types of satellite data products would begin in the late 1980s with the introduction of new sensors such as a solid state multi-spectral linear array imager, a synthetic aperture radar imager, and various all-weather ocean and ice monitoring sensors.

Combined Meteorological and Land System

The advantages of combining the GOES, NOAA and LANDSAT systems arise from major economies of scale resulting from the elimination of duplicate facilities and from the nature of the data that can be produced. Combining the meteorological and land satellite programs would enable the operator to eliminate duplicate facilities and reduce administrative support, thereby reducing the overall cost of operating an integrated system. In addition, for the future, payload combinations may be possible which would permit significant economic benefits.

Combining the programs also increases the value of the data to the user. The earth's environment is such that atmospheric, earth and oceanic processes are intimately intertwined. Thus, although many diverse sensors and satellite platforms are used to collect data, it is important that the collecting systems and the data produced by these systems be integrated as part of a global environmental observing system. Data from meteorological and high resolution earth images can be combined to provide commercial products which are superior to those currently available.

Although weather and earth resources data products are interrelated, they now must be retrieved using different procedures from several agencies. The attendant delays have been a restraint on the development of a commercial marketplace. Timely, single point availability of all remote sensing data would be another benefit of combining these systems under a sole private operator.

Reduction in Federal Outlays

Through consolidated and efficient operations COMSAT can provide the Government more data and services than the Government currently provides itself at a cost which is substantially less than projected Government outlays. Further savings would be achieved through payments to the Government by COMSAT for the satellites and related equipment.

Because they were developed and are administered separately, the present NASA and NOAA programs have evolved with duplicative facilities and redundant functions. Separate design, engineering and contract administrations combine with complex contracting procedures to produce expensive procurements of satellites and related equipment. The Government staffs and operates, on a 24-hour-a-day, 7-day-a-week basis, two separate control centers and data acquisition networks, one for the GOES and NOAA satellites and the other for the LANDSAT satellites. This duplication of facilities and redundant hierarchical management and staff functions contributes to the high cost of the Government programs.

The Government also operates four separate data processing facilities for the GOES, NOAA and LANDSAT programs with redundant equipment and personnel. Furthermore, the Government conducts numerous applications research projects which have commercial potential and therefore could and should be carried out by the private sector.

COMSAT proposes to consolidate the control and data acquisition functions for all satellites as well as the processing of data products. Our estimates, which are based on public information, show that the Government's present utilization of personnel (not including personnel involved in long range research and development) is two to three times greater than would be required for the efficient operation of the COMSAT system.

We believe that a commercial owner would be able to introduce new technologies, many of which are available today, more quickly and at less cost, with attendant savings in manpower and increases in productivity.

Substantial savings can only be realized if the Government promptly discontinues its ownership and operation of civil remote sensing satellite programs and procures satellite data through a long-term contract with COMSAT. A long-term contract would establish in advance a pricing formula for the Government's procurement of COMSAT data and services and would provide the necessary business base for COMSAT to procure follow-on satellites and develop a commercially viable remote sensing satellite system.

COMSAT proposes to furnish data and services under a 15-year contract with the Government. The first ten years of the contract would be under terms similar to a fixed price, minimum quantity, purchase type contract (subject to an inflation escalator) and would also provide for a reduction in price to the Government by a percentage of commercial sales. COMSAT proposes that during the last five years of the contract, the Government's procurement of COMSAT data and services be under terms similar to a requirement contract at prices established in light of developing markets and prices charged to commercial customers. The reduction in price to the Government would continue in the last five years of the contract.

Designated Entity Legislation

Transfer of civilian remote sensing systems to the private sector will require a cooperative effort on the part of both the Congress and the Administration. From the standpoint of simplicity, prompt action, and assured results, the most effective means by which to effect this transfer is legislation which would designate an appropriate private entity.

COMSAT's Unique Qualifications

Established as a result of the Communications Satellite Act of 1962, COMSAT is a unique private corporation which has for nearly 20 years successfully met public needs and furthered national objectives through the development, operation, and use of communications satellite systems. COMSAT has accomplished this without financial assistance or subsidy from the Government, and efficiencies in operation have allowed us to make four successive rate reductions of 48.5, 15.5, 5.0, and 11.8 percent, for international satellite communications within the last three years.

Through COMSAT General, which was created in 1973, COMSAT has been able to apply the benefits of satellite technology to specialized communications markets. In 1973 COMSAT undertook the successful development of the world's first commercial maritime satellite communications system (MARISAT). Today, through the International Maritime Satellite Organization (INMARSAT), more than 1000 commercial ships and offshore facilities use the MARISAT satellites for voice and data communications in support of their activities. This capability was made possible because development of the MARISAT system to meet a unique U.S. Navy requirement provided a basis for a commercially viable maritime satellite communications system.

In this regard, the status of remote sensing today is similar to the inception of maritime satellite service in 1973. With a Government commitment to procure its data requirement from the private sector owner and operator of the system, further development of civil remote sensing could be undertaken in a manner which provides the benefits we have described to both the Government and the private sector.

COMSAT Prepared to Proceed

As the designated entity, COMSAT would be prepared to assume responsibility on a commercially viable basis for the development of satellite remote sensing, including the major functions associated with planning, operating, and managing the remote sensing system and marketing its data products and services. To this end we have developed and presented to the Executive Branch for its consideration our EARTHSTAR plan by which we would effect the transfer of the civilian land and meteorological programs to the private sector by purchasing under appropriate terms and conditions the GOES, NOAA, and LANDSAT satellites and certain related ground equipment from the Government. We would be prepared to conduct product and service-oriented research and development, but we believe the Government should continue to have a responsibility for basic research and development in which major technical unknowns are involved and the ultimate applications unclear.

If implemented, we believe our plan could substantially reduce overall Federal expenditures and increase the Federal tax base as a result of new companies entering the market as well as from increased earnings from existing companies. Users would benefit from our plans to improve the timeliness of data delivery and increase the diversity of data products. In addition, we would seek aggressively to implement new technology and to improve our data acquisition capabilities. Such technical improvements, coupled with a vigorous marketing effort, will accelerate the commercialization of remote sensing space applications, thereby strengthening U.S. leadership in commercial space applications and exerting a positive influence on our economy.

In addition, the COMSAT system would produce data products which would be marketed worldwide. U.S. manufacturers of processing equipment for COMSAT data will, therefore, also benefit by the development of the international marketplace for data products. Further, the COMSAT system will provide U.S. spacecraft manufacturers with opportunities for the manufacture of satellites and sensors used in the system, whereas U.S. manufacturers would most likely be precluded from participating in foreign programs.

A continued position of leadership in remote sensing is also important for the United States to ensure that increased internationalization of satellite remote sensing is consistent with U.S. interests. A strong commercial system would ensure a leadership role for the United States in the structuring of international arrangements for compatible and complementary national civil remote sensing system and in the formation of any international remote sensing organization.

Conclusion

Budget reductions and increasing foreign competition have brought the United States to an important crossroad with regard to its civilian remote sensing programs. The Federal Government can no longer afford to maintain current levels of service and is not planning to develop a system which will be competitive with foreign programs. A new civilian remote sensing satellite policy must be established for the commercialization and transfer of the government programs to the private sector in order to reduce Federal outlays, preserve continuity of services and accelerate the development of a commercial system which will be competitive with foreign suppliers of data and services derived from non-U.S. remote sensing programs.

COMSAT therefore urges the early adoption of a policy which will bring to an end the repeated delays and frustrated attempts to commercialize civilian remote sensing activities and ensure the continued uninterrupted flow of data from U.S. civil remote sensing programs. The keystone of such a policy should be the designation of an appropriate private sector entity to assume the responsibility for the development of a single integrated earth environmental observation system to meet the needs of the Government and other users. We believe COMSAT is the logical entity to assume the responsibility. If so designated, COMSAT is prepared to dedicate the resources necessary for the successful development of such a system.

Mr. **Scheuer**. Thank you very, very much.

Congressman Brown?

Mr. **Brown**. Dr. Maughan, I don't know exactly where to begin with this proposal which is of great interest to me. Let me ask you if you could describe to us the economic analysis that you have made in terms of the capital investment and the return on that investment that might be available? You may have that in your proposal but I have not had a chance to go through it in detail.

Dr. **Maughan**. Yes, sir. That is described in the proposal that we have delivered.

The analysis that we have performed is based on the following: We believe through market studies that there is a significant but latent market for products and services, not only here in the United States but globally. I am not only referring to land-type data but weather as well. Specifically, several of the people we have talked to in the weather area have said if we can provide them services on a more timely and more catered basis, using the same basic data that the Government collects today, they would be willing to pay us to provide that to them even though they could get it essentially free from the Government. I think there is an expanding market base there.

Mr. **Scheuer**. Excuse me for interrupting.

Dr. **Maughan**. Yes, sir.

Mr. **Scheuer**. Why would they be willing to pay you when they can get it for free elsewhere?

Dr. **Maughan**. Because the customers that they service need timely data: For example, the people who are preparing the value-added products do not want to sort through the tremendous amount of data that comes on the lines, for example, that they have to dig through to get to the specific information they want. It would be part of our proposal to encourage, either through our system or a cottage industry, to develop specialized products that would be delivered to these customers. I think there is a growing business base there.

Mr. **Brown**. We understand, at least in some degree, the market potential for weather services. There is a well-developed market already. However, for the land imaging, the figures that I recall are that the present sale of data through the Government system at the present time is miniscule compared to the actual capital investment in the system. Maybe, the Government is not a very good projector of markets and you should be much better at that. However, I am interested, specifically with regard to the land imaging, in the detailed projections that you have made in terms of return on investment for the markets that you foresee.

Dr. **Maughan**. That is a fundamental question. What you are referring to is LANDSAT products.

Mr. **Brown**. Yes.

Dr. **Maughan**. You will notice I was very careful not to say that we would develop LANDSAT products. We are talking about is land remote sensing products, which in a commercial sense is considerably different than LANDSAT. That is, if we were to start today from scratch we would not construct LANDSAT-D in its current configuration. We could not make money at it. The products are of general use. The sensors are designed to meet general expectations, and you cannot sell general products to specialized needs.

That is the difference between a Government program which is research and which has brought us to this point—and I would be the last to criticize the research aspects of it—but we are in a new era, we are in a commercial era. That means we have to specialize and develop these services to meet these needs.

Mr. **Brown**. Your proposal commits COMSAT to develop the new technology in terms of sensors that would have higher marketability, that would produce data having higher marketability——

Dr. **Maughan**. Yes.

Mr. **Brown** [continuing]. So that you could increase the flow of cash through the system. That would include something like you referred to that the SPOT system has, stereoscopic imaging that would be of benefit to the petroleum industry, and other things of that sort?

Dr. **Maughan**. Yes. In a specific instance, it would be our proposal to modify LANDSAT-D prime with a specialized sensor and provide the data stream to not only the Government but to those users, petromining users, as well.

It should be noted that the corporation, the management of COMSAT, has not looked at this as a short term program. COMSAT is committed for a long-term pull on this program, and the way we have put the package together means that we have to design new systems, new approaches, deliver data on new communications networks and so forth, in order to make the money that we believe is necessary to ensure that we have these new systems coming on-line. We are committed to do so.

Mr. **Brown**. Well, the kind of questions that are raised by a proposal of this sort are rather fundamental, as I am sure you know. They do not stem from a desire or a lack of desire to involve the private enterprise system. I think this is highly desirable and we should be moving toward it.

However, in effect you are asking that we confer a monopoly on some designated agency to provide this service, and this always raises questions as to whether or not you may be proposing, instead of an enhancement of the private enterprise system, a monopolistic threat to the private enterprise system.

Dr. **Maughan**. I would take exception to the use of the words. We are asking for a designated entity to transfer the current systems to us and us alone. That is all we are asking for. We are not asking for a monopoly. If another group cares to enter into and fly satellites, we have no problem with that at all as long as the arrangement between the Government and COMSAT provides for the delivery of services to the Government. We do not, in the terms you use—that is, a monopoly—preclude the flying of other systems.

Mr. **Brown**. However, you would want the Government to acquire its data needs from the designated entity?

Dr. **Maughan**. The data needs that would be provided through the EARTHSTAR system. Now if the Government saw other needs and decided to meet those in other ways, yes, the answer is "Yes."

Mr. **Brown**. Well, obviously we have a mixed bag here. When Comsat was set up, it was given a monopoly over one form of service. It was designated the U.S. representative for international communications purposes but you obviously have competition in the domestic area.

Dr. MAUGHAN. That is correct.

Mr. BROWN. Conceivably, something like this would happen on the system that you propose.

Another kind of problem has to do with who takes the responsibility for the residual need, that is, the markets that are not profitable, the R. & D. that is not profitable, these kinds of things. You have contemplated that problem, I presume?

Dr. MAUGHAN. We have looked extensively at not only providing for those specialized needs but for what you might call the public interest needs, including health and safety, which was discussed earlier. As a program to evolve a large marketplace, we think there are ways to meet those needs and would design into our program the response and responsibility to do so. It would not be in our interest to turn away from those large—and I think they are substantial—needs on behalf of the public interest.

Mr. BROWN. I do not want to take up an undue amount of time, Dr. Maughan, on this but at some future date would you be amenable to an informal seminar to discuss this in more detail?

Dr. MAUGHAN. I would be elated to do so.

Mr. SCHEUER. Let me interrupt here. I am not going to ask you any questions now, Dr. Maughan, because this proposal opens up such an infinite number of most interesting public policy questions that Congressman Brown has alluded to, or at least the tip of the iceberg. I think this requires not only a briefing—which we would very much enjoy—with some of our other colleagues who have legislative responsibilities that impinge on this area, but I think we ought to have at least a full day of hearings on your proposal with some other witnesses who would have something to contribute.

Therefore, let's just consider that you have tickled our appetites today. We may submit some questions to you in writing. I think we will go ahead and schedule the briefing that Congressman Brown alluded to, perhaps include Ron Flippo, who has committee jurisdiction in this area, and others. Then I think we will perhaps confer informally with you about having a full morning of hearings on this matter to explore it more fully.

Dr. MAUGHAN. Thank you very much, gentlemen.

Mr. SCHEUER. Thank you very much.

We will now call the last panel: Mr. Thomas Oneto of the AOPA, of which I am one of the founding members, the Aircraft Owners and Pilots Association; Dr. Amos Eddy of the Oklahoma Climatological Survey; Mr. C. Richard Ward of Ocean Data Systems; and Mr. Bobby McKown of the Florida Citrus Mutual.

We must be out of this room no later than 20 minutes to 1:00. That gives us 25 minutes. To the extent that you can sum up your thoughts in 3 or 4 minutes each, we will have some time for questions. If we cannot—I am not going to brutalize you with the gavel—if you cannot, we will not have any time for questions, in which case we will submit our questions in writing.

Therefore, let me remind you that all of your prepared testimony will be printed in full at the appropriate point in the record, and we would hope that you would sum up in 3 or 4 minutes. Let's hear first from Mr. Thomas Oneto of the Aircraft Owners and Pilots Association.

STATEMENT OF THOMAS ONETO, PLANNING OFFICER, TECHNICAL POLICY AND PLANS, AIRCRAFT OWNERS AND PILOTS ASSOCIATION

Mr. **Oneto**. Thank you, Mr. Chairman. For the sake of brevity I will summarize my summary.

Mr. **Scheuer**. Fine.

Mr. **Oneto**. Weather is very important to aviation. To emphasize this we merely have to examine the accident statistics for the last 10 to 20 years, and we readily discover that 4 out of every 10 fatal accidents and 2 out of every 10 nonfatal accidents is attributable to either a weather cause or associated factor.

In 1977, general aviation stated their needs to the Secretaries of Commerce and Transportation. For the sake of brevity, within our testimony we have outlined the specifics of those recommendations. We had asked that NWS be staffed to provide training and certification of observers. This is more important now than it was at that particular time. I will elaborate on that later.

We also requested that the FAA field test simple cloud height and visibility measuring devices. We wanted some operational tests performed to prove the feasibility of using cloud height rather than cloud cover and visibility rather than prevailing visibility to define takeoff and landing weather requirements.

The importance of weather observations on pilot decisionmaking cannot be overemphasized. NWS is presently proposing the closing of 20 part-time and 25 full-time stations. Appreciating that not all of these stations will be located on airports, we are concerned because concurrent with this the FAA is proposing reducing their flight service stations to 60, and presently a number of flight service stations have been part-timed because of the controllers' strike.

General aviation is forecasted to increase 4.6 percent annually to the end of this decade. If no alternatives are developed, we will experience an increase in demand associated with a decrease in service. We have a paradox, and because of the safety ramifications of this paradox, consider it an unhealthy situation.

Therefore, we recommend as a near-term solution that NWS continue to be funded and that these stations not be closed unless some alternative means of observation is made available.

On the long-term solution, we have what is known as a SAWRS program. It is a supplemental aviation weather reporting system. This is performed by a certificated observer, who is certificated by the National Weather Service, with certain minimum observing equipment. It is a labor-intensive system but it is something that we have needed for quite a while. Eventually that system, because it is labor-intensive, would be replaced by automatic low-cost weather observation systems, or ALWOS. We recommend that the National Weather Service staff both the instructional and field personnel necessary to qualify these individuals as observers.

On the forecasts, for preflight planning has taken on a new importance because of the introduction of the general aviation reservation program. This requires that you receive a reservation prior to entering the air traffic control system.

Mr. SCHEUER. Could you sum up, please, Mr. Oneto?

Mr. ONETO. Yes, sir; I sure will.

No. 1, we recommend that the National Weather Service continue with their present system. The only exception would be the qualification of certificated observers for the supplemental aviation weather reporting system and the eventual introduction of the automatic weather observation stations.

We looked at the possibility of a quasi-governmental corporation but public experience with such organizations would cause a public reaction against such an arrangement. Then we looked at the possibility of placing all the weather programs under one Federal agency. This option offered tremendous economic benefits to the users. One agency could provide for observations, analysis, and dissemination of weather products. Since all weather services are very similar, an agency offering two or more could quite easily provide all three services. Civil and military needs can be met as it is presently being handled in the air traffic control system.

We also recommend that a technical advisory committee composed of representatives of the various kinds of users be appointed to identify products and services of the unified weather services. The role of the private meteorologist, we feel, will change dramatically as Government is trimmed back, and the increased needs of the private sector, as elaborated on by some of the earlier speakers, will contribute to this new role.

Additionally, aviation will become more dependent on airport and fixed-base operators for airport observations. What we are saying here is, "Give us—industry—the opportunity to do things for ourselves."

On behalf of the association and its 260,000 members, we appreciate your courtesy in considering our views on these most important topics.

[The prepared statement of Mr. Oneto follows:]

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STATEMENT OF THOMAS L. ONETO

PLANNING OFFICER, TECHNICAL POLICY AND PLANS

AIRCRAFT OWNERS AND PILOTS ASSOCIATION (AOPA)

Prepared for Hearings February 23, 1982 before the

SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH, AND ENVIRONMENT

COMMITTEE ON SCIENCE AND TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES

I am Thomas L. Oneto, Planning Officer, Technical Policy and Plans, of the Aircraft Owners and Pilots Association, representing the interests of the more than 260,000 members who employ private aircraft for business and personal purposes.

We appreciate the opportunity to present our views respecting the effect of budget cuts on weather services.

Adequate forecasts and timely weather information are vital to the safety of all aviation operations.

Observations

Since weather services provided to general aviation are a joint effort of the National Weather Service (NWS) and the Federal Aviation Administration (FAA), we cannot address a particular weather product without mentioning the role of both agencies in its acquisition, analysis, and dissemination. The Congress long ago vested in the FAA the responsibility for determining the aviation weather requirements and advising the National Weather Service accordingly so that NWS could proceed to include those requirements in their budgetary process for implementation. Although the general aviation industry defined its needs quite clearly to both the NWS and FAA, we have yet to see these needs included in subsequent NWS budgets.

A number of general aviation representative associations formed a working group several years ago to produce documentation of general aviation's weather requirements. These were provided to both the FAA and the National Weather Service. More recently, nine associations, representing general aviation and the air taxi/commuter airline interests, worked together to produce a joint letter to the Secretaries of Transportation and Commerce to provide them with recommendations for provision of improved weather services for general aviation and the air taxi/commuter airlines. (A copy is attached to this statement.) It may be summarized as follows:

1. Weather has been cited as a cause or factor in four of every ten fatal accidents and two of every ten nonfatal accidents in general aviation for a number of years. The general aviation accident rate could be improved substantially if accurate and timely weather information could be obtained readily by general aviation pilots.

2. Despite significant progress in satellite observation techniques, extensive computer and communications capabilities, and large efforts in research and development, there has been little progress in providing weather observations at the growing number of airports that have either, or both, a published instrument approach procedure or a large number of based aircraft.

3. A study made in 1976 by Mr. Samuel V. Wyatt for AOPA listed all airports with approved instrument approach procedures together with the weather observation services, if any, and the number of recorded IFR approaches made by general aviation aircraft. This study revealed that of the 1707 airports with approved instrument approach procedures, 914 had no weather observation service.

With the above in mind, the groups jointly determined what they believe to be realistic minimum requirements for weather observations at airports used by general aviation. The objective was to specify only those elements of weather that have a significant influence on safety and, where practicable, be susceptible to automatic observation with direct readout by uncertificated airport personnel such as airport "unicom" operators. The following elements are recommended as minimum requirements for observations at a single site on an airport:

a. Height of clouds at or below 5000'
b. Visibility or visual range
c. Wind direction and velocity
d. Temperature
e. Altimeter

The following additional elements are considered desirable, but not essential:

f. Dew point
g. Precipitation
h. Peak gusts
i. Average, trend and prevailing cloud height
j. Obstructions to vision

The nine associations then recommended:

1. The FAA use its authority under the Airport and Airway Development Act to make grants to states and other eligible bodies for the purchase of approved manual or automatic weather observing equipment.

2. The NWS be staffed to cooperate fully with any purchaser of weather-observing equipment in providing training and certification of observers as required.

3. That the FAA field test simple cloud height and visibility measuring devices (such as automatic ceilometers and back-scatter devices) to determine their operational usefulness if the measurements are read by uncertificated personnel or the information is transmitted automatically to pilots or to a collection station.

4. To the extent the operational tests prove feasible, the FAA use "cloud height" and "visibility" to define landing and take-off weather requirements if appropriate to the type of operation involved.

Since this joint letter was submitted on June 20, 1977, automated low-cost weather observation systems (ALWOS) have been developed by both government and industry. However, rather than approve the basic system requested by the users, FAA has opted to require many features in the system to meet their (the Agency's) specific needs. Such requirements will not only delay introduction of the systems - some of the enhancements have yet to be developed - but the resultant cost would be prohibitive. Thus, the very system that the users specified was needed to meet their needs, will be "Buck Rogered" beyond their economic grasp and quite probably never brought to fruition.

To further complicate matters, the NWS has recently announced they would be involved with the FAA in approval of the systems. Up to this point in time the FAA, through its aviation weather responsibilities, has been the responsible agency involved with standards, development, testing, etc.

Weather observations, forecasts, and their various methods of dissemination exert the greatest influence on pilot decisionmaking. No other single element has such an effect on general aviation safety as does weather. The National Weather Service is proposing closure of 20 part-time weather stations and 25 full-time stations. Concurrent with these closings, the Federal Aviation Administration, through its FSS modernization plan, is proposing reducing their FSSs to 60 and has presently part-timed a number of stations due to personnel shortage. Fortunately, since a number of these locations have both a NWS office and FSS, the numerical loss of aviation observation locations will be considerably less than the total would lead you to believe. However, there will be a net loss of observation locations.

Hence, with general aviation activity level forecasted to increase 4.6 percent annually until the end of this decade, and the demand for all-weather operating capability increasing proportionately, the industry will be faced with an ever-decreasing number of weather observation sites. To offset this trend, the Aircraft Owners and Pilots Association proposes certain near- and long-term solutions to this problem.

The near-term solution AOPA is advocating is to encourage the states to develop joint aviation weather programs with the NWS, FAA, and the local communities. Such a program has been in place in the state of Nebraska for the past few years and is working very well. It is a cost-sharing effort between the various parties resulting in timely weather reporting and dissemination. It is an offshoot of the FAA/NWS program, "Supplemental Aviation Weather Reporting Stations (SAWRS)."

Participating in the program are the state, the FAA, the NWS, and the local community or airport authority. It is a cooperative program requiring the utmost in administrative and logistical coordination and joint economical support.

The program is constantly reviewed during the contract period. There is an annual meeting between the sponsoring parties and the observers, affording the opportunity for all parties to air their problems and offer suggestions for improving services.

Under the agreement, the state trains the observers at state expense. The exception to this is where a new location is established, and then only for initial staffing. The NWS will train, test, and certificate the new observers on a one-third (state, FAA, NWS) shared contract basis.

Equipment is provided by the NWS, including the necessary forms. Each site is usually inspected by state personnel, and should equipment need to be repaired or replaced, and not be available from NWS supply, the state purchases the equipment and is reimbursed by the NWS.

Payment is predicated on the number of observations tallied and observers are paid a basic fee for day observations (6 am to sunset), and additional fee for night observations (sunset to 6 am). Normal hours for observations are 7 am to 7 pm local time, although some sites require observations at 9 pm, midnight, and 3 am for forecast purposes. If a commuter or air taxi operator requires observations during other than normal hours, they make their own arrangements, including payment of the observer.

The state pays the community monthly at the rate of three-fourths the total amount due the observers; the community then adds its fourth, and the observer is paid accordingly. Both the FAA and the NWS are billed quarterly by the state for their half (one-quarter equally) of the total amount. There are 13 observations taken daily, seven days a week, and three night observations (9 pm, midnight, 3 am) taken when required for weather observations.

The observers transmit weather information to the nearest FSS by using WATS numbers. If for some reason this cannot be done in a timely manner, the observer calls the FSS collect. Pilots obtain their information from the FSSs through WATS numbers or direct dialing.

AOPA appreciates that the near-term program is a stopgap measure and widespread national implementation would result in a labor-intensive system requiring the presence of human observers for the entire observation period. Therefore, the long-term solution must result in a system that is both reliable and economical. It must provide for widespread dissemination of observations made available during the normal operating hours of the airport, and not require a human observer be present. Thus, the need for automatic weather observation equipment to serve aviation's weather requirements has never been greater.

Regarding weather observations, AOPA recommends:

1. That the NWS be staffed to cooperate fully with any purchaser of weather observing equipment in providing necessary training and certification for observers.

2. That until the ALWOS plan is put into effect, the states, the FAA, and the NWS cooperate in joint programs to provide Supplemental Aviation Weather Reporting Station observations at those locations losing weather observations because of tower, NWS office, or FSS closings, in addition to those locations with approved instrument approaches.

Forecasts

Of the utmost importance to safety of flight is preflight planning. The more accurate and timely the information, and the higher the confidence level in the forecasting science, the greater its influence on the decisionmaking phase of the flight. With the introduction of the General Aviation Reservation (GAR) program, an additional need has been established for accurate long-range weather forecasts.

Long-range applications include Terminal Forecasts (FTs), Area Forecasts (FAs), Winds and Temperature Aloft Forecasts (FDs), and route forecasts.

Short-range forecasts in the form of in-flight advisories are used to provide en route information on potentially hazardous weather phenomena. Such forecasts provide information concerning safety of flight for all aircraft including small aircraft and most recently, hazardous in-flight weather advisory service.

We believe the NWS feels reasonably comfortable with its forecasting capabilities even though a reduction in Weather Service Field Offices will occur. AOPA is not in a position to agree or disagree with that supposition but can only reflect on two problems currently experienced with the forecasting program that bear mentioning. They specifically address short-range forecasts of hazardous weather and are:

1. Short-range forecasts are produced manually and forecasters are unable to keep up with amending inaccurate forecasts in rapidly changing weather situations.

2. Today's aviation weather communication system does not permit timely distribution of the critical forecasts that are prepared.

We can appreciate that the NWS has under procurement and development a new system called Automation of Field Operations and Services, that should aid materially in correcting these problems. On November 18, 1981, the Comptroller General released a report critical of the automation program (CED-82-6), but upon review we cannot acknowledge any problem that is insurmountable or can't be corrected. This system should contribute considerably to the timeliness of critical weather forecasts.

Reflecting a moment on the General Aviation Reservation program, the requirement that a round trip flight be completed within the 24-hour period beginning at the time the flight plan is filed, has placed the pilot in the position of filing a flight plan for a return departure time for which there is no forecast. We would like to have a 36-hour forecast available to accommodate this situation. It is our understanding that the NWS is working on this but we have no details at this time.

Proposed Budget Cuts

In reviewing the NWS budget cuts proposed for FY 1983, we are opposed to the closing of those stations located on airports where there is no alternate source of weather observations.

We also would like to see the funding for NWS instructors restored. The availability of these instructors is necessary to train and qualify the weather observers required to provide the observations that industry needs. The Supplemental Aviation Weather Reporting Stations are essential as a near-term solution to the need for weather observations at airports. A system of these stations would provide an interim solution until automated observations. It would be phased out as the automation program is completed.

It would be difficult to discuss budget without mentioning efficiencies. The general public is comprised of many diverse occupations, industries, and interests. The NWS and its predecessors were established to meet the weather needs of the general public. However, over the years they have delegated some of their responsibilities to other agencies. Although this may have offered certain economies of scale at the time, the weather programs of these other agencies have escalated into a taxpayer's nightmare. Duplication of research and expenditures, agency autonomy, and poor coordination of efforts have all contributed to this dilemma.

In our view, the federal meteorological coordination scheme established by OMB Circular A-62 has not produced the quality and quantity of weather services the nation deserves. The problem stems from the existing split responsibility for provision of weather service to specialized users. This results in the creation of several miniweather services each pursuing its own specialized weather objectives in operations, equipment and research and development.

As an example, for some time, the FAA and aviation interests have been developing a computer-generated voice response system for weather dissemination. Now under test in the Washington area this system is accessed by telephone. Simultaneously and completely independent of the FAA effort, a "green thumb" system has been developed for agricultural interests. It, too, is accessed by telephone but the data can be presented on any television set. Similarly, FAA has developed an Automatic Weather and Notam System (AWANS) while NWS has an Automation of Field Operations and Services System (AFOS). The purpose of each system is to automate the retrieval of data: AWANS for use by the FAA flight service specialist; AFOS for the meteorologist. We understand that the two systems are not compatible for direct interface.

In short, the current system for providing weather services to aviation interests is not adequate. The system is not efficient due to the degree of duplication not only in the R&D area but also in the shred out to specialized users.

It is our impression that funding and facilities for weather purposes are so divided and dispersed that no one is being served as well as would be possible if the resources and mission objectives were combined and pursued jointly rather than severally. We find little merit in the dozens of little weather bureaus in various agencies each pursuing their own special weather objectives, whether in operations, equipment, or research and development, as if their kind of weather was divisible from the whole or could be understood in the absence of a knowledge of the whole.

As a solution, AOPA recommends that we establish a single national organization responsible for all-weather requirements to include specialized users such as aviation, agriculture, etc. This organization would be budgeted directly for all-weather requirements to include observation, collection, distribution and R&D.

User Charges

AOPA is opposed to both the term "user charges" and the special taxes used as a means of financing or helping to finance certain federal programs. These programs were enacted by Congress in the public interest and should be supported by general taxation. If the public interest does not justify support by the general taxpayer, the laws establishing the programs should be replaced.

In the interest of brevity, those in general aviation observe that:

1. They are being overwhelmed with facilities and "services" provided by the government which they do not want or "require" and cannot afford.

2. As these "services" increase, freedom of movement is reduced, access to major portions of airspace is curtailed, use of many major airports is denied or priced out of reason, equipment and operating costs are increased enormously, and aircraft utility is reduced to marginal or negative benefit levels.

3. The spiraling costs of the airport and airway system will progressively price more people out of general aviation so that the remaining burden falls upon an ever-declining number of people.

The Role of Government Versus Industry in Providing Weather Services

No discussion of the role of government versus industry in providing weather services would be complete without discussing what products or services would enable industry to accommodate its own needs.

Acquisition of preflight data by providing pilots a means for self-briefing, plus the ability to direct access the weather products dissemination system, would greatly reduce the work load on the FAA's flight service specialists and NWS's weather station personnel. Additionally, it would fill any voids created by increased work loads recently imposed on FAA flight service station (FSS) personnel or closures of Weather Station Offices (WSOs).

There are two new weather dissemination systems being developed that hold a lot of promise for general aviation pilots in the not too distant future. One is the Voice Response System being developed for the FAA and tested in the Washington, DC and Columbus, Ohio areas at the present time. With this system, a pilot can use a touch-tone telephone to request weather reports and forecasts for any route in the country. The information is provided from computer storage through computer-generated voice to the pilot's phone. AOPA considers this to be an excellent preflight weather service and recommends that the system be implemented on a nationwide basis as soon as possible.

The other system being developed is the National Weather Service program for Automation of Field Operations and Services. This is a computerized, high-speed, weather communications system that will collect, store and disseminate all-weather information for National Weather Service operations. When the system is complete, all of the weather information in the system can be accessed at any location through the use of a computer terminal on the circuit with the information presented on a cathode-ray tube. It is anticipated that somewhere down the road the computer terminal connections on the AFOS circuit will replace the Service A teletypewriter in pilot briefing rooms, airline offices, military installations and other public interest services.

The AM Weather program on public television with some 250 TV outlet stations over the country is an excellent aid for preliminary preflight planning. AOPA has been the primary sponsor of this program since its inception several years ago.

Weather observations can be provided at airports by qualifying employees of the airport or fixed base operators as SAWRS observers through a joint NWS, FAA, state and airport effort. These joint-effort programs have been in place for a number of years. Typical of such a program is the one being conducted in the state of Nebraska as mentioned above. A copy of the "Nebraska Plan" is enclosed as Attachment "B" to this testimony.

Weather update and severe weather avoidance can be provided during the en route phase of the flight by a Cockpit Weather Display Unit (CWDU). Using NWS's weather radar, the information is digitized, processed, and then transmitted over the very high frequency omnidirectional range (VOR) voice feature to the aircraft. Within the aircraft a processor converts the signal into alphanumeric form on either a printer or the radar scope. Other information, such as sequence reports and terminal forecasts, will also be available. Estimates are that the aircraft unit will cost in the $2000-$3000 range. Thus, we have a piece of equipment that is needed, provides timely information, contributes to flight safety, and is affordable.

These are but a few examples of how both industry and government can cooperate in designing systems that serve the needs of users and the responsibilities of the agencies. They also illustrate how the cost impact can be minimized by the increased participation of industry.

Upon further examination of the roles of the federal government and industry in the provision of weather services, AOPA considered the following options:

1. Continue with the present system.

Upon reviewing the existing and future systems it became readily apparent that we must continue with the present system until new organizational structures are put into place.

The only exception would be the joint government and industry SAWRS program which will gradually be replaced by the ALWOS equipment.

2. Establish a quasi-governmental corporation to provide weather services.

An alternative to the federal government would be to establish a quasi-governmental corporation to provide the Federal Government functions related to weather and climate services. While COMSAT is a good example of a successful undertaking under this concept, others like the Postal Service leave much to be desired and effectively cause a public reaction against any further excursions in providing service to the public under such an arrangement.

3. Place all the weather programs under one federal agency.

Such a program would produce tremendous economic benefits. Weather services benefit agriculture, aviation, coal, commodity exchanges, construction, electric industries, gas, ground transportation, marine operations, municipalities, oil, smoke stack industries and waterway transportation, etc. Since all the weather service operations for the above are very similar, i.e., observations or raw data, analysis and forecasting and dissemination of weather products, an existing agency that provides one or two of these services could quite conceivably provide all three with a minimum of increased personnel and facilities.

The question may be asked: Is it possible and practical for a unified federal weather service to respond to both civil and military needs and to specialized needs as well as general public needs? We have considered this question and believe the answer is: Yes, it can.

As a precedent there is the Federal Aviation Administration's Air Traffic Service which operates a "common system" of airspace and air traffic control for both civil and military users. By and large, it serves well. We see no valid reason why a similar weather service should not be even more successful. Satisfying specialized needs will add to the body of knowledge about general weather and is likely to result in higher accuracy and greater reliability in weather service for all users, general public and specialized alike.

A revision of the weather program should also contain specific provision for a technical advisory committee composed of representatives of the various kinds of users of the products and services of the unified weather service.

The role of the private meteorologist will change as more opportunities resulting from the trimming back of government services, plus the needs of the media and the private sector increase. Additionally, aviation will become more dependent on airport and aircraft operators for weather observations.

On behalf of the Aircraft Owners and Pilots Association, and its 260,000 members, we appreciate your courtesy in considering our views on these most important topics.

Attachments

Attachment A
June 20, 1977

JOINT LETTER

FROM

Aircraft Owners and Pilots Association
Aviation Distributors and Manufacturers Association
Commuter Airline Association of America
Experimental Aircraft Association, Inc.
General Aviation Manufacturers Association
National Association of Flight Instructors
National Air Transportation Associations, Inc.
National Business Aircraft Association, Inc.
National Pilots Association
(Addresses listed on Attachment No. 2)

TO:

The Honorable Juanita Kreps
Secretary of Commerce
Commerce Building
Washington, D. C. 20230

The Honorable Brock Adams
Secretary of Transportation
400 7th Street S. W.
Washington, D. C. 20590

Dear Madam Secretary:

Dear Mr. Secretary:

Weather has been cited as a cause or factor in four of every ten fatal accidents and two of every ten non-fatal accidents in general aviation for a number of years. We believe the general aviation accident rate could be improved substantially if accurate and timely weather information could be obtained readily by general aviation pilots.

Despite significant progress in satellite observation techniques, extensive computer and communications capabilities, and large efforts in research and development, there has been little progress in providing weather observations at the growing number of general aviation airports that have either, or both, a published instrument approach procedure or a large number of based aircraft.

A study made in 1976 by Mr. Samuel V. Wyatt for the Aircraft Owners and Pilots Association, entitled "Criteria for Weather Observations at General Aviation Airports", listed all airports with approved instrument approach procedures together with the weather observation services, if any, and the number of recorded IFR approaches made by general aviation aircraft. A tabulation of this listing revealed that of the 1707 airports with approved instrument approach procedures, 914 had no weather observation service. A more complete analysis chart is included as Attachment No. 1.

We recognize that it is neither economically feasible nor desirable to station U. S. government personnel (either FAA or NWS) at all airports where weather observations are required. Further, we recognize that training and certification of observers supplied by non-governmental organizations imposes a burden on the National Weather Service and is unattractive to airport management and fixed base operators due to costs involved for the purchase of approved observing equipment and supplying trained observers even though weather observations are colateral duties. Nevertheless, this system must be used until automatic observing systems become practical.

With the above in mind, we have jointly determined what we believe to be realistic minimum requirements for weather observations at general aviation airports. Our objective was to specify only those elements of weather that have a significant influence on safety and, where practicable, be susceptible to automatic observation with direct readout by uncertificated airport personnel such as airport "unicom" operators. We recommend the following elements as minimum requirements for observations at a single site on an airport:

a) Height of clouds at or below 5000'

b) Visibility or visual range

c) Wind direction and velocity

d) Temperature

e) Altimeter

The following additional elements are considered desirable, but not essential:

f) Dew point

g) Precipitation

h) Peak gusts

i) Average, trend and prevailing cloud height

j) Obstructions to vision

It should be noted that we do not include a requirement for either "ceiling" or "ground visibility" as defined in FAR Part 1. "Ceiling" requires either human estimation of whether clouds are "scattered", "broken" or "overcast", "thin" or "partial", "obscured" or not, and height of various layers of clouds. This requirement has long thwarted development of simple inexpensive automatic weather observing systems. Similarly, "ground visibility" also requires either human observation or a complex of automatic devices to determine the "prevailing horizontal visibility". We believe simple measurement of "cloud height" and "visibility" at a single point on an airport is an acceptable minimum for most operations and both weather elements are susceptible to relatively inexpensive automation. Certainly, tests of these concepts should be conducted to prove or disprove their operational feasibility.

Regardless of whether observing equipment is automated or not, the problem of equipment procurement for hundreds of airports owned by a multiplicity of local governments and private interests must be resolved. It appears to us that there is an easy and simple solution as the Aviation Trust Fund has an ever growing surplus paid in by the users, is dedicated to improving the airport and airway systems, and all concerned - the Congress, the government agencies, and the users - support the use of Trust Funds for capital improvement expenditures.

As you know, the Airport and Airway Development Act of 1970, including amendments of 1971, 1973 and 1976, provide for the grant of Trust Funds for the purchase of navigation aids as a part of "airport development" and also for direct purchase and installation of "airway facilities" by the Government. The definition of any "air navigation facility" in the Federal Aviation Act of 1958, includes ". . . any apparatus or equipment for disseminating weather information . . . " in addition to the more general definition of "any facility used in . . . aid of navigation." Weather observations make operations at any airport safer and any navigation aid serving that airport more useful. Further, a long term and continuing precedent for the classification of weather observing equipment as "air navigation facilities" has been established by the Congress in making appropriations to the FAA to purchase and install weather observing equipment at flight service stations and airport traffic control towers.

In view of the foregoing, we recommend:

1) The FAA use its authority under the Airport and Airway Development Act to make grants to states, and other eligible bodies for the purchase of approved manual or automatic weather observing equipment.

2) The NWS be staffed to cooperate fully with any purchaser of weather observing equipment in providing training and certification of observers as required.

3) That the FAA field test simple cloud height and visibility measuring devices (such as automatic ceilometers and back-scatter devices) to determine their operational usefulness if the measurements are read by uncertificated personnel or the information is transmitted automatically to pilots or to a collection station.

4) To the extent the operational tests prove feasible, the FAA use "cloud height" and "visibility" to define landing and take-off weather requirements if appropriate to the type of operation involved.

It is realized that this suggested program, if successful, will require more communications, dissemination and analysis capabilities than now exist However, these problems are solvable. Increasing the number of general aviation airport weather observations will improve flight safety. In addition, other industries, such as agriculture and marine, should benefit by the provision of these additional hundreds of surface weather observations.

We will be happy to meet with you or your representatives at any time to discuss these ideas in more detail.

Sincerely,

Signatures on following page

John Baker, President
Aircraft Owners and Pilots Association

Robert E. Clark, President
by G. F. Quinby, Past President
Aviation Distributors and Manufacturers Association

Thomas S. Miles, President
Commuter Airline Association of America

David H Scott

David Scott, Washington Representative
Experimental Aircraft Association, Inc.

Edward W Stimpson

Edward W. Stimpson, President
General Aviation Manufacturers Association

Jean Scheerer, Executive Secretary
National Association of Flight Instructors

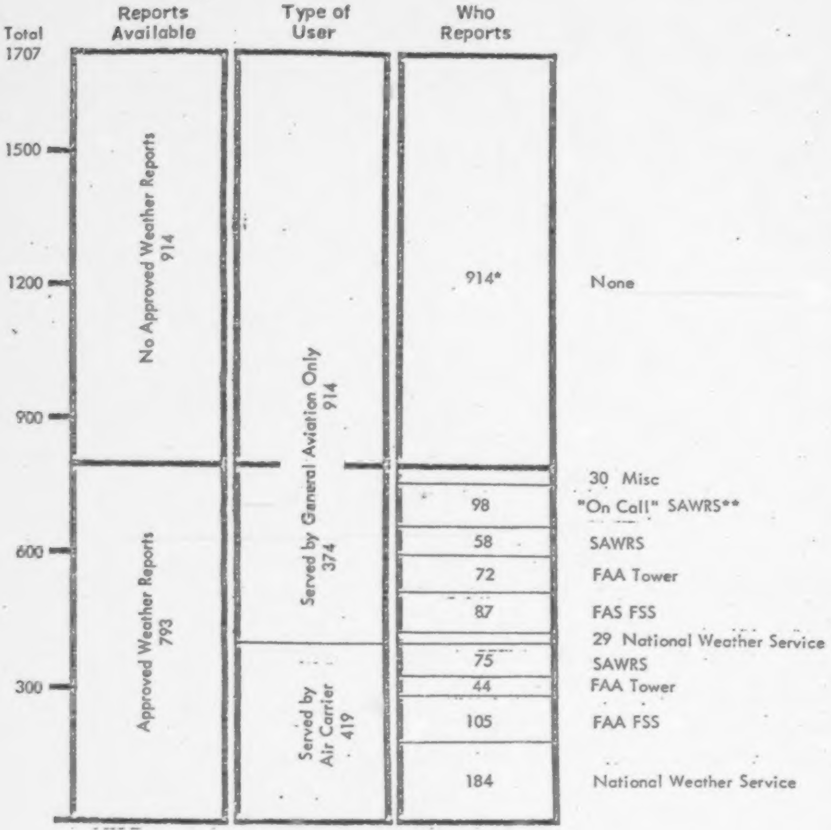
Lawrence L. Burian

Lawrence L. Burian, President
National Air Transportation Associations, Inc.

John H. Winant, President
National Business Aircraft Association, Inc.

William H. Ottley, Executive Director
National Pilots Association

Weather Reporting Service at Airports
with Published Instrument Approach Procedures



Source: Derived by David Thomas, GAMA, from data in AOPA report, "Criteria for Weather Observations at General Aviation Airports," by Samuel V. Wyatt

*Note: 190 of these have 1,000 or more instrument approaches annually; 374 have more than 50 IA

**SAWRS—Supplementary Aviation Weather Reporting Station

ATTACHMENT NO. 2

Aircraft Owners and Pilots Association
Air Rights Building
7315 Wisconsin Avenue
Washington, D. C. 20014
(301) 654-0500

Aviation Distributors and Manufacturers Association
1900 Arch Street
Philadelphia, Pennsylvania 19103
(215) 564-3484

Commuter Airline Association of America
Suite 728
1001 Connecticut Avenue, N. W.
Washington, D. C. 20036
(202) 223-9024

Experimental Aircraft Association, Inc.
P. O. Box 229
Hales Corners, Wisconsin 53130
(414) 425-4860

General Aviation Manufacturers Association
Suite 1215
1025 Connecticut Avenue, N. W.
Washington, D. C. 20036
(202) 296-8848

National Air Transportation Associations, Inc.
1156 15th Street, N. W.
Washington, D. C. 20005
(202) 293-2550

National Association of Flight Instructors
Ohio State University Airport
Box 20204
Columbus Ohio 43220
(614) 459-0204

National Business Aircraft Association, Inc.
11th Floor
One Farragut Square S.
Washington, D. C. 20006
(202) 783-9000

National Pilots Association
805 15th Street, N. W.
Washington, D. C. 20005
(202) 737-0773

Attachment B

State Role In Aviation Weather Information Programs

(The Nebraska Plan)

Weather observations, forecasts, and their various methods of dissemination exert the greatest influence on pilot decision-making. No other single element of general aviation has such an effect on its safety as weather. Each year, for the past 15 years, weather-caused or weather-related accidents have accounted for 36% of the fatal accidents and 41% of the fatalities. More than 50% of these weather accidents were associated with IFR approach procedures, or a descent below IFR minimums.

The regulatory requirements for weather information have been with us since the first flight rule was written. It has been required of pilots in Federal Aviation Regulations (FAR) Parts 91 - General Operating and Flight Rules, 121 - Air Carriers, and 135 - Air Taxi Operators, with the introduction of the Federal Aviation Act of 1958 and before. Subsequent to the initiation of the Federal Aviation Act of 1958, two additional certification and operations parts of the FARs have been introduced: Part 123 - Flying Clubs Utilizing Large Aircraft, and Part 125 - Large Airplanes With 20 or More Passenger Seats or 6000 Pound Payload or More.

Although the safety and regulatory requirements for weather information and dissemination have long been established, the general aviation community is now confronted with a paradox. The number of National Weather Service (NWS) and Federal Aviation Administration (FAA) weather and flight service station locations are being reduced because of budgetary cuts. With growth and need, we have less.

The Aircraft Owners and Pilots Association (AOPA) has been constantly exploring new means and methods for providing real time weather at general aviation airports. One such program meeting these goals has been introduced by the state of Nebraska.

Following is a brief description of the program, explaining roles of the participants and the costs involved.

Participating in the program are the Nebraska Department of Aeronautics, the FAA, the NWS, and the local community or airport authority. It is a cooperative program requiring the utmost in administrative and logistical coordination and joint economical support.

The program is presently into the second year of a three-year contract period. There is an annual meeting between the sponsoring parties and the observers, affording the opportunity for all parties to air their problems and offer suggestions for improving services.

Under the agreement, Nebraska trains the observers at state expense. The exception to this is where a new location is established - and then only for initial staffing - the NWS will train, test, and certificate the new observers on a one-third (Nebraska, FAA, NWS) shared contract basis.

Equipment is provided by the NWS, including forms. Each site is inspected by personnel of the Department of Aeronautics, and should equipment need to be repaired or replaced, and not available from NWS supply, NWS is billed for replacement.

Payment is predicated on the number of observations tallied and observers are paid $1.46 for day observations (6 a.m. to sunset), and $2.20 for night observations (sunset to 6 a.m.). Normal hours for observations are 7 a.m. to 7 p.m. (CST), although some sites require observations at 9 p.m., midnight, and 3 a.m. for forecast purposes. If a commuter or air taxi operator requires observations during other than normal hours, they make their own arrangements, including payment, with the observer.

The Department of Aeronautics pays the community monthly at the rate of three-fourths the total amount due the observers; the community then adds their fourth, and the observer is paid accordingly. Both the FAA and the NWS are billed quarterly for their half (one-quarter equally) of the total amount. There are 13 observations taken daily, seven days a week; and three night observations (9 p.m., midnight, 3 a.m.) taken when required for weather forecasting. Full-time observers have been costing the program about $600 monthly for airport/FBO employees, and $800 monthly for nonemployees. Costs for the three nightly observations are in addition to the above.

Pilots obtain their information from the FSSs through five 800 Watts numbers or direct dialing. The observers transmit weather information to the nearest FSS by using Watts numbers. If for some reason this cannot be done in a timely manner, the observer calls the FSS collect.

Since the program was initiated two years ago, four new locations have been added to the program. Eventually, a point will be reached whereby they will require a weather observation program be established prior to approval of an instrument approach procedure.

Thomas L. Oneto (AOPA)
July 28, 1981

Mr. **Scheuer**. Thank you very much.

We will now hear from Dr. Amos Eddy of the Oklahoma Climatological Survey.

STATEMENT OF DR. AMOS EDDY, DIRECTOR, OKLAHOMA CLIMATOLOGICAL SURVEY

Dr. **Eddy**. Thank you very much for giving me the chance to make this presentation. I offered all of the State climatologists in the country a chance to reply to this. In my written testimony I have two dozen or more replies for you to consider.

I seem to be the only one here who is addressing the climate issue directly, explicitly, and also the only one to represent a State government. I think the provision of weather services and climate services is a three-way business, partly by the Federal Government which has done most of it in the past; partly by the State government, and the State climate offices around the country are now getting into the business of providing service at the State level in a similar way to what EDIS and the National Weather Service supplies at the national level; and the third one is private enterprise.

I want to make only a couple of points. You talked about the value of weather and I wanted to talk about the value of climate. The impact of climate is one thing; the impact of climate information is another thing. I think it is quite straightforward to document that the impact of the use of climate information by policy people, decisionmakers, is on the order of 10 times the NOAA budget per year, the impact on the gross national product.

In my State, where water, energy, and food are important, the impact to the gross State product is easily demonstrated to be on the order of $100 million a year. I think since these things can be documented, the value of climate information in particular instances, equally then the value of the climate observation in the observation network, and the forecast services and the climatological services can be documented. For example, if you are going to remove one station of observations you can quantify the impact on the services and consequently the contribution to the gross State or gross national product.

That is really all I wanted to say at this particular time. I would be able to supply the documentation or answer questions.

[The prepared statement of Dr. Eddy follows:]

Testimony Presented to

Subcommittee on Natural Resources, Agricultural Research

and Environment

of

Committee on Science and Technology

U.S. House of Representatives

on

The Effect of Proposed Budget Cuts on Weather Services

by

Amos Eddy

Director, Oklahoma Climatological Survey

on

February 23, 1982

in

Washington, D.C.

EXECUTIVE SUMMARY

1. The potential economic value of weather analyses and forecasts in the 0-12 hour time frame is great and the technical capability to provide a significant portion of the information required is either close to or in the testing stage by NOAA. Support for this will be very cost effective. The value of extended forecasts (1 month to seasonal) is also significant and efforts by NOAA/CAC in this regard should be supported. One funding decrease concerns the NEXRAD project where the payoff in water resource management is potentially so large that any delay would be poor economically; consequently, support to NOAA for this project should be accelerated.
2. The effect on special weather services of proposed budget cuts will be adverse in the short run as user service drops (1-3 years) and very beneficial in the long run as the private sector takes over.
3. The appropriate user fees paid to the National Weather Service would be:

   i) for general weather forecast and storm warnings - no charge,

   and ii) for data - a charge for cost recovery (excluding original observation acquisition and archiving costs).
4. The government should provide special weather services for federal agencies only and leave everything else to state agencies and private industry.
5. Public awareness of the potential value of weather and climate information is subjective at best: for most important applications it is almost non-existent. If NOAA would spend a very few million dollars a year - distributed using standard economic geography concepts - for targeted, quantitative, documented public relations activities, the consequent increase in demand for its services would make its future growth logically certain and politically unassailable.

Introduction

To begin with, I would like to thank this Committee for giving a state climatologist the chance to make a presentation on the subject of weather services to users. In order to be able to present to you the broadest possible view within the constraints implied, I have polled all the state climatologists across the country and also a few representatives of the private sector. Some two dozen replies form an appendix to my comments. Although there is some diversity in the opinions expressed, my interpretation of these letters and of other personal discussions can be summarized as follows:

i) the federal government should be responsible for collecting, quality controlling and archiving the essential basic data sets,

ii) the federal government should issue general weather forecasts and severe storm warnings,

iii) the state weather/climate agencies should collect, quality control and archive supplemental state and regional data

iv) the state weather/climate agencies should issue standard summaries and special services at the state and regional levels,

and v) private industry should provide all special services for fees set by free market competition to the entire private sector and to the public sector under contract as requested.

State-of-the-Art

In a talk to the American Meteorological Society, the Administrator of NOAA presented an excellent description of the actual and near state-of-the-art in observing, processing and dissemination systems relevant to the 0-12 hour time frame of economic importance in near-real-time decision making. This comprised descriptions of PROFS (prototype regional observing and forecasting system), PROFILER (continuous and automated profiles of wind, temperature and humidity), CSIS (centralized storm information system), NEXRAD (next generation doppler radar), and VAS (visible and infrared spin scan radiometer atmospheric sounder). These should be adequately supported -- the return on such an investment will be substantial. Dr. Byrne also discussed the efforts being made by NOAA in the areas of extended forecasts and the use of climatological services. He mentioned CAC (climate analysis center), DAMUS (data management and user services), and NEDRES (comprehensive national environmental data referral system). Such facilities are essential for answering planning and policy questions and should be supported. NOAA/EDIS has another valuable group (CEAS) which is making significant progress in assessing the economic impacts of weather and climate and in disseminating this information to decision and policy makers.

In all the above areas of activity NOAA is doing a good job and continued or increased support is easily demonstrated to be cost effective.

In the area of special services the NWS has been doing rather poorly, even its mediocre efforts are deteriorating and should be dropped. The private sector can and will pick up such services, will develop a better product and can make the marketing pay. There will likely be a hiatus of 1-3 years in user services while private industry develops the required capabilities and streamlines marketing procedures; nonetheless, it is essential that the federal government refrain from providing competition in this arena in any way which tends to slow down the transfer of responsibilities or dilute the private enterprise effort.

There has been considerable progress in the marketing of information to a rather broad segment of the public. This has been associated with the availability of a range of powerful and versatile (but inexpensive) home computers. A combination of a microprocessor, a television set and a telephone puts a wealth of customer-specific information in the hands of even the non-technically oriented user in very near real time. He can base his real-world decisions on the latest weather/climate/economic information --- and all for a capital investment of about 25% of the cost of a new car with operating expenses which are trivial compared to the benefits he can reap. Examples of such systems would be AGNET of Nebraska, GREENTHUMB of Kentucky, and the Indiana system which supplies continual updates of agro-weather information to over 100 county agents across that state.

State Activities

The ability of the private sector to satisfy local special service demands will depend on special regional or state data bases which are more effectively situated in state archives than in the rather remote (and very busy) national archives. State Climate Centers are developing to meet these needs. Furthermore, state level policy making requires regional information which can best be provided by state climate centers which are conversant with the local problems, know the local people, and can process the local data to meet such state and local public sector demands.

In this newly emerging area of public user-services, development across the nation is not at all uniform nor optimal. EDIS/NCC has been a great deal of help in getting things started and should receive additional funding to assist with their endeavors in this regard. The National Climate Program Office has caused more harm than good up to this point in time and it will take a monumental effort on its part to establish credibility with most State Climatologists. NCPO responsibilities should be transferred to EDIS which has proven itself to be competent in such activities.

Recent efforts at National Weather Service headquarters give encouraging indications that the NWS is putting improvements in public service ahead of its own image enhancement. Partnerships with state climate offices and with private industry have been discussed seriously... and much effort is being expended to start things moving in the direction of better user-weather-service. This should clearly be supported, as it will pay off handsomely in terms of increased productivity in many sectors of the economy.

A Further Suggestion

Since NOAA has been providing most of the weather and climate services to this country and has a service network already in place; and, since disruption in the maintenance and expansion of weather/climate services would be costly to the country as a whole (i.e., decrease and/or fail to enhance the GNP), it is proposed that this agency spend a few years of effort in educating users concerning reasonable expectations of the manner in which they can enhance the operations of their own enterprises by the best use of weather and climate information. To support this I propose that 90% of all research funding in NOAA, not explicitly directed toward user services and products, be diverted to these ends. In the long run this would hurt nothing. At the end of a 3-5 year period the increase in GNP resulting from this public education campaign and concomitant private sector activity would be enough not only to fund research appropriate to NOAA's mission at desired levels once again, but would likely be enough to support the entire NOAA budget.

In summary: NOAA has plenty of money to do a first class job in meeting its responsibilities. Some of its priorities are out of order and some of its commitments should be changed; however, there are signs that this is being done.

APPENDIX

OFFICE OF THE
STATE CLIMATOLOGIST

December 22, 1981

Dr. Amos Eddy, Director
Oklahoma Climatological Survey
710 ASP, Suite 8
Norman, Oklahoma 73019

Dear Amos,

Thank you for the opportunity to comment on the three options stated in the NACOA issue paper of 5/15/81. I regret it has taken so long to develop and consolidate my opinions but proposals of this scope will not be settled by January 1982 and maybe not for a few more Januarys.

The three options presented appear to be very shallow in thought and there certainly are many more options. I can agree that much more work needs to be done.

I am concerned over the numerous small special-interest groups that meet and present recommendations that serve their own purpose. To name two: the one held in Atlanta that were briefed about at the AASC meeting, but no State Climatologists were invited to the meeting; the other held in Madison, Wisconsin in October. These special interests are fracturing NOAA and NOAA service because there is no direction. I have just received the Connecticut climate-sponsored report. What a waste! I wonder what they plan for an encore.

Another option to those presented would be to shred out the NOAA functions which have a potential profit and turn them over to industry. This may lead to options for the remaining functions. COMSAT has proposed taking over the NOAA satellites. This is a start.

I just completed a report on a workshop we coordinated for NASA on similar communications proposals to clarify government-industry relations for the 1990's. Strangely, some of the relationships stated at that workshop could be applied to a government-industry relationship for weather service.

The 60 invited participants were primarily presidents or vice-presidents of companies, large and small, who profit from the communications industry and NASA, Defense Department and a few other government agencies. Copies of the Executive Summary and conference introduction are attached with some applicable points indicated.

Administered by The University of Alabama in Huntsville, Johnson Environmental and Energy Center
Huntsville, Alabama 35899

An Affirmative Action/Equal Opportunity Institution

OFFICE OF THE
STATE CLIMATOLOGIST

Dr. Amos Eddy
December 22, 1981
Page Two

It appears that a similar workshop of top industry and government representatives is essential to provide information on which to base decisions for the issues you propose.

If you are interested in a copy of the entire 55-page report, let me know. Much of the format and procedures could be used as a pattern to clarify the weather service issues. A report such as this provides guidance for major changes and carries considerable influence.

Sincerely,

Gene

Eugene A. Carter

EAC:vs

Encl

ARIZONA STATE
UNIVERSITY TEMPE, ARIZONA XXXXX 85287
OFFICE OF THE STATE CLIMATOLOGIST (602) 965-6265

December 16, 1981

Dr. Amos Eddy
Oklahoma State Climatologist
The University of Oklahoma
Room 219, 200 Felgar
Norman, Oklahoma 73069

Dear Amos:

I tend to agree with your comments and many of the comments of others in letters written to you about selecting option three of the NACOA Issue Paper by J. Almazan (9/15/81). This is the first I've heard of this document or seen anything about it. I thank you for sending it along.

My office is not in a mode at this point to provide instantaneous climate or weather information to the public. We can provide data with a maximum of a week to two weeks' lag to anyone desiring results of 34 of 258 Arizona CLIMAT stations in a daily data array format with an interpretation of departure statistics of that data. The data are preliminary data received by NWS in Phoenix via telephone each day. We get the data on a weekly basis by establishment of a mail box slot at that office. We could easily get it by phone connection to our Laboratory in the near future and intend to do so. We've had great cooperation with the Arizona NWS in obtaining any satellite imagery, surface maps, and surface data that is collected by the Phoenix office. Our problem, and theirs, is lack of in-house personnel to quality control the data quickly and efficiently, enter it into our computer, and answer any and all requests virtually in real time. Our state is small in population, but big in climate impacts--e.g., energy, water, and agriculture. We receive over 20 requests a day to a staff of 1 and 2/3's people on board. We were hoping the NCPA of 1978 would help alleviate this problem and make local climatic services through our state office more effective. This apparently doesn't appear to be on the horizon. Thus, I would agree that option three in concert with local state expertise involvement, i.e., state climate offices, might help alleviate the large demand for climate data of almost a real time nature. By climate data, I mean weather information cast in a "climatic" framework--e.g., are we in the middle of a drought - where, to what degree, etc. What are climatic probabilities of alleviation, etc? On the energy-climate sensitivity curve at that time of year, what are chances of various peak loads occurring in the next month? These kinds of questions require weather data interpreted by a climatologist with systems geared to the users' applications.

I am concerned about interruptions in already ongoing local state services by cutbacks and continual discussions of changing things, although option three certainly is preferrable to others.

Sincerely,

Anthony J. Brazel

Dr. Anthony J. Brazel,
State Climatologist for Arizona

AJB/sb

Colorado Climate Center
Department of Atmospheric Science

Colorado State University
Fort Collins, Colorado
80523

7 December 1981

Dr. Amos Eddy
Oklahoma Climatological Survey
University of Oklahoma
710 Asp, Suite 8
Norman, OK 73019

Dear Amos:

I would be glad to comment on your material to be used in a presentation in Washington. However, I need to know who the audience is and what the real topic is. Your presentation of November 2, 1981 under the subtitle Oklahoma Survey Experience is a condensed case for real time and after the fact climate information. The Introduction and Summary both refer to the NACOA ISSUE PAPER by Almazan dated September 15, 1981. In Almazan's paper (p. 2) he cites a definition by Batton of three basic types of weather services which only include forecasts. Climate is maintained in option three but not the first two. Were you asked to comment on forecasts? Were you asked to comment on NOAA generally? My real concern is that nearly all of the analysis by NACOA is related to services provided by the National Weather Service which do not include much more climate information. As a result, I was rather lost as to why you were making strong recommendations about NWS forecast activities in terms of options when your Oklahoma Experience seemed more related to climatic services.

Sincerely,

Thomas B. McKee
State Climatologist

TBM:op

The
University
of
Connecticut

STORRS, CONNECTICUT 06268

COLLEGE OF AGRICULTURE
AND NATURAL RESOURCES
Department of Renewable
Natural Resources

December 14, 1981

Mr. Amos Eddy
Oklahoma Climatological Survey
710 Asp, Suite 8
Norman, Oklahoma 73019

Dear Amos:

In response to your presentation on the NACOA paper, I'm not sure a quasi-government corporation would work better than NOAA in providing weather services, but I don't see a lot of harm in trying as long as the NCC role and data base is carefully protected during the transition.

You mentioned some "scurrilous and incompetent studies" about the utilities efforts of promoting energy conservation. I'd appreciate it very much if you could send me copies of or references to these studies so we can review them for our Cost-Benefit Analysis.

Thanks,

Dave

David R. Miller
State Climatologist

DRM:amp

Enclosure

UNIVERSITY OF DELAWARE
NEWARK, DELAWARE
19711

DEPARTMENT OF GEOGRAPHY
PHONE: 302-738-2294

December 7, 1981

Dr. Amos Eddy
Oklahoma Climatological Survey
710 ASP, Suite 8
Norman, Oklahoma 73019

Dear Amos:

I have read your analysis of the three options for the provision of weather services with interest. I share your concern that the present policy of cut backs, and deactivation of stations cannot be permitted in view of the increasingly vital role climatological services are playing in our world but I am not certain that the third option--the quasi-governmental corporation--is the best way to remedy the situation. The history of other quasi-governmental corporations gives us some reason to suspect that that option may result in confusion, management problems and ever higher fees.

I would hope that we all could agree that the Federal government must maintain the observation network, must issue general forecasts to the public, and must be responsible for forecasts of life-threatening weather events. If these activities are endangered by cut backs, I believe we must increase our efforts to see that such cut backs are not allowed to stand. Specific forecasts to special users (even to agriculture and aviation groups) can, however, be paid for on a user fee basis. In this area, the Weather Service would compete with private meteorological groups and that is fine. There must be strong encouragement for private firms for they have a real contribution that they can make. Thus at the present moment I am more of a supporter of option 2 than of 1 or 3.

The key, of course, is how the revenues generated by user fees are to be used by the NWS. I would hope that they could be used to augment NWS programs rather than to allow cut backs in Federally supported NWS budgets. Thus they might be used to slow the rise in future budgets but not to permit a decrease in current Federal expenditures. But no one really knows what use will be made of the user fees if charged by the NWS. While option 3 may ultimately be the only way out I would prefer to see 2 tried first before going to 3 as a last resort.

Good luck on your presentation. Do emphasize the need not to curtail current data collection and dissemination activities of NWS.

Sincerely,

John

John R. Mather
Professor and Chair

bmw

OFFICE OF THE STATE CLIMATOLOGIST
Institute of Natural Resources · Ecology Building
THE UNIVERSITY OF GEORGIA
Athens, Georgia
30602

Tel. (404) 542-1555

December 7, 1981

Dr. Amos Eddy
Oklahoma Climatological Survey
710 Asp, Suite 8
Norman, OK 73019

Amos:

Although I was not privileged to review the NACOA paper dated 9/15/81, I gleaned a gist of its contents from your reproduction of Almazan's analysis. Similarly, the other supporting evidence gave enough background to reply to your inquiry.

My opinion on the material you provided -- well, ... Almazan's was the most informative. I don't disagree with your Summary, but some alternatives appeal to me better.

Otherwise, ... Since I became better aquainted recently with the weather and climate agencies within NOAA, I am quite disappointed with that bureaucracy; nevertheless, I hasten to give it abundant credit for some very good work, the likes of which they probably inherited rather than developed. But, NOAA needs a house-cleaning. The status quo is wholly incapable of evolving into a better system with better services. Any-and-all kind of pressures from OMB, or elsewhere, that necessitate changes among the climate and weather administrators shall eventually be good for everybody (I doubt, however, that will happen). That takes care of option #1.

Option #3 is not satisfactory either, vis-a-vis the Postal Service, AmTrack, BART, and others. The chief problem is the lack of competition, an absolute essential for progressive evolution. Then, the costs of operation become too great. Furthermore, administrative positions in quasi-governmental corporations always need intuitive, intellectual leadership, but incompetents are frequently channelled into high places. That should not be facilitated for continuation. Too much mediocre administration will pass into the corporation.

Now for Option #2. I notice you don't favor it; but I do, completely. Private enterprises of every sort must be promoted in this country, to the fullest extent -- including climate and weather services. Delta Airlines has probably the best weather information system in the world among air transporters. Their forecasters use federal data, of course, but they generate the precise information really needed. Georgia Power has a communication network of 100

(Continued)

microwave towers, which, when interconnected with two new weather radar systems and a series of automated remote weather sensors, will provide splendid facilities for forecasting ice storms, energy loads, etc. They too depend on federal weather information. The American Broadcasting Company is in the process of moving its entire weather center to Atlanta. Also, John Coleman is involved with development of a multi-million dollar weather center in Atlanta to provide 24-hour information to the cable networks via satellites. I suppose they plan to use federal data to generate their information. You know that FWIS can stand on its own, but it needs federal data; the same can be said for GREENTHUMB, and others. These manifestations of private enterprises indicate clearly to me that the government should sell its weather data and recover perhaps as must as 50% of the cost of acquisition. That would be good business, it would promote new adventures in private enterprises, help clean out a bureaucracy, reduce the diarrhea from government printing presses, take some services out of the National Weather Service and it would hasten the day when AFOS begins to become what the letters mean. (The hinderences to Option #2, indicated by Almazan on p. -6-, are superficial, argumentive and almost ridiculous -- simply words to put down that option.)

I suppose my concepts of what Option #2 should be are somewhat idealistic for the political realities of today. Nevertheless, weather information is a popular business that can be more self-supporting. If Option #3 is the most expedient politically, it's a tolerable solution, but not a wise one; experience teaches that.

Sincerely,

Gayther L. Plummer
Acting State Climatologist

GLP/ls

P.S. Thanks for the monthly publication, it's very good and informative.

Enclosure

Atlanta Constitution, Wed. Aug. 5, 1981.

All-Weather TV: The Forecast Is Mixed

Cable Channel Is Scheduled To Begin Transmission From Atlanta In 1982

By Thomas Oliver
Constitution Staff Writer

A cable industry analyst was asked what sort of advertiser would sign a contract for commercial time on an all-weather cable channel.

"An umbrella manufacturer. A snow-shovel manufacturer," quipped Harold Vogel of Merrill Lynch, Pierce, Fenner & Smith Inc. in New York.

Landmark Communications Inc.'s Weather Channel, which is scheduled to begin transmission from Atlanta in the spring of 1982, may be the brunt of a few industry jokes. But Weather Channel officials are serious about what they perceive as their idea's viability.

When John Coleman, ABC Television's "Good Morning America" meteorologist, approached Norfolk, Va.-based, Landmark about financial backing for an all-weather cable channel, an in-house staff of market researchers reported favorably on the proposed venture.

"We wanted to be convinced we could attract the advertising," said Hugh Eaton, newly named vice president, general manager and treasurer of the Weather Channel. Eaton said Landmark's new-ventures marketing research staff convinced top management and chairman and chief executive officer Frank Batten that an all-weather channel would be profitable.

Landmark decided, based on its research, to back the $20 million venture. A studio with a staff of 71 will be based in Atlanta at a yet-to-be-decided location.

The Weather Channel will be offered free to cable operators and supported by advertising. It will carry 12 minutes of advertising an hour, with 10 minutes allocated by the Weather Channel and two minutes provided to the cable operator for local advertising.

Industry analyst Bonnie Cook of Atlanta-based Robinson-Humphrey Company Inc. said cable operators would find the Weather Channel to be a market for local advertisers, but she questioned how readily national advertisers would be attracted to it.

The market for local advertising, Cook said, would be the people who normally don't advertise on television — the small retail shop, for example, instead of a large department store.

See CABLE, Page 2-C

EXPECTS NATIONAL ADS
Vice President Hugh Eaton

Cable

Continued From Page 1-C

"The market is comparable to the type of advertisers on radio," Cook said. "It is different from the normal television advertiser but there is a market for that small retail shop."

Eaton, however, said he is "convinced we are going to get the national advertising."

He backs up that claim with an A.C. Nielsen study that found that while American television viewers watch one sporting event, two movies and five newscasts per week, they tune in the TV weather forecast seven days a week.

"More people in one week will watch the Weather Channel than watch Cable News Network, ESPN (the Entertainment and Sports Network) and the Movie Channel, our research shows," said Coleman at the press conference last Thursday announcing the new weather network.

While research shows weather reports are important to viewers, it may prove difficult to convince advertisers that cable viewers will tune the Weather Channel, and not the local commercial station or even CNN, for weather news.

In evaluating the Weather Channel, both Vogel and Cook made comparisons with Turner Broadcasting System Inc.'s still unprofitable CNN.

Cook indicated that the Weather Channel would find the going even rougher because of its more limited appeal.

"Nielsen can't yet measure CNN's audience share and CNN is a 24-hour, all-news (including weather) channel with a high penetration," Cook noted.

Landmark, which owns TeleCable Corp., the nation's 15th largest cable operator with 250,000 subscribers, predicts the Weather Channel will break even at the end of three years of operation.

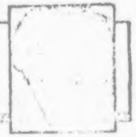
Eaton seemed prepared for the growing pains, convinced that "in five to 10 years we will be the most watched program that exists."

OU
RETAIL
YS SALE

ptember 7, 1981 Atlanta Constitution + Journal (Labor Day edition)

ather Finally Getting The Time It Deserves, Says John Colemar

Richard Zoglin



HERE'S A sizable school of thought which holds that the subject of weather has been greatly overemphasized on TV. Local stations tinly devote 20 percent of their newscasts — a good portion of their resources — to regaling viewer with satellite photos, color radar and a ly paid meteorologist, all to deliver a forecast t could probably be disposed of in 20 seconds.

To say John Coleman doesn't subscribe to that ool of thought is to seriously understate the e.

Coleman, the weatherman for ABC's "Good rning America," is so much a believer in the ther, in fact, that he's about to start a 24-hour nel for cable TV filled with nothing but ather. The satellite-beamed service — which was leman's brainchild and is being financed by dmark Communications, a Norfolk, Va.-based dia company — will originate from Atlanta and scheduled to start operation next April. And Colen contends it will fill a great need.

"There's an enormous wealth of weather information that has never gotten communicated to the public on a real-time basis," says the 48-year-old ABC weatherman. "For the first time, we'll be able to give weather the coverage it truly deserves."

Coleman — who talked about his planned weather channel while in Atlanta for the recent Eastern Cable Trade Show and Convention — contends that most TV meteorologists are "enormously frustrated" at not being able to convey everything they know on the air. "It will be a joy to put American meteorologists to work who have been languishing in TV stations across the country and getting on the air for just a few minutes every day."

The Weather Channel, as it has been dubbed, will hire about 20 of those languishing meteorologists. They will appear on camera on a rotating basis, explaining the national weather patterns, reading the radar screen and giving forecasts around the clock. Forecasts for each locality — transmitted to each cable system from the Weather Channel's central headquarters — will be flashed on the screen every five minutes.

Coleman himself will appear on the weather channel as well, but not until September 1982. (That's when ABC's exclusive hold on him ends, though his contract with the network extends until September 1983.) While working on the Weather Channel, Coleman will continue to do his "Good Morning America" weathercasts from Atlanta — probably from the studios of ABC's local affiliate, WSB-TV.

Coleman may even be making some appearances on Channel 2's local news. "We'd like to work out something with him," Channel 2 General M ager Fred Barber said recently. Negotiations currently under way, he added.

The Weather Channel is one of several spec ized cable channels that have been announced in cent months, but the question in the minds of s cable observers is whether it is *too* specialized whether enough people will watch the channel attract the advertising needed to support the se ice.

Coleman admits that only hard-core weat junkies will watch for longer than a few minute a time, but contends that the majority of view will tune in at least some time during the day. cites surveys showing that 60 percent of all viewers watch a daily weathercast, and that 77 p cent call TV their primary source of weather. I these people, Coleman says, the Weather Char will provide the most technically advanced most current weather information available.

See COLEMAN, Page

Coleman

Continued From Page 1-B

"Just as (Ted Turner's) Cable News Network isn't designed for someone to sit and watch for 24 hours a day, so is the weather channel," says Coleman. "Certainly there will be a repetitious nature to the format. But the difference is that weather information is never the same. Weather is more constantly changing than news, sports or any other part of the environment."

What's more, Coleman says, the Weather Channel will be able to include lots of specific weather data now given short shrift — such as boating and skiing forecasts, as well as special weather bulletins. (On an average day, says Coleman, the U.S. Weather Service issues 200 such special warnings and statements; up to 1,000 on an active weather day.)

For most viewers, watching round-the-clock weather may seem about as exciting as tuning into the test pattern, but Coleman insists that the TV audience will learn to love the Weather Channel.

"People will tune in for the first time just to find out the temperature," he says. "Then they'll find out that we provide a lot more information, and they'll start to rely on us for the weekend outlook, for the weather where their relatives are, for planning their next day's activities: Should I wear a heavy coat or a light coat or a medium-weight coat?"

Atlanta was chosen as the Weather Channel's headquarters for several reasons, Coleman says. First, the city has "enormous credibility in the cable industry" because of the presence of Ted Turner and other cable operations here. Second, it was one of the cities agreeable to ABC as a site for Coleman's "Good Morning America" weathercasts. And third, he says, "Atlanta is a terrific city — a city I wanted to take people to."

> ***"They'll start to rely on us for the weekend outlook, for the weather where their relatives are, for planning their next day's activities."***
>
> ***—John Coleman***

Part of Atlanta's attraction for Coleman is, not suprisingly, the weather — which he describes as "terrific," though "not the best in the world."

And where might that be? Coleman, a diplomat as well as weatherman, won't say.

"I love variety," he insists. "I love high humidity and I love the dry desert climate. If I had my choice, I'd have a condominium in each of 12 different places. The only thing I would do is banish air-conditioning."

Iowa Department of Agriculture

R. H. LOUNSBERRY
SECRETARY OF AGRICULTURE

THATCHER JOHNSON
DEPUTY SECRETARY OF AGRICULTURE

IOWA WEATHER SERVICE
Room 10 Terminal Building
Municipal Airport
Des Moines, Iowa 50321

HENRY A. WALLACE BUILDING
DES MOINES, IOWA 50319

December 4, 1981

Dr. Amos Eddy
Oklahoma Climatological Survey
710 Asp, Suite 8
Norman, Oklahoma 73019

Dear Amos:

Congratulations on your invitation to participate at the NACOA hearings soon. You will be emphasizing some very important points about the growing consumer community and our ability to serve.

I view with some apprehension the budget cuts to the NWS (and EDIS) and the consequent reduction of services to our Nation.

In these times we realize the status quo service levels are not good enough. We will soon need to provide our Nation the very best environmental decision making information possible within an economical and timely framework, to achieve economy in government and improve productivity.

I am of the opinion that changes in goals and services within the present organization are needed. To go to Option III may be correct, but I believe that we need a thorough study of this course of action before it is launched. Thus, I am somewhat hesitant that we should exercise Option III until it is further analyzed. Yet, improvement is needed.

Sincerely,

Paul Waite
Paul Waite

PURDUE
UNIVERSITY DEPARTMENT OF AGRONOMY

December 10, 1981

Dr. Amos Eddy, Director
Oklahoma Climatological Survey
710 ASP, Suite 8
Norman, Oklahoma 73019

Dear Amos:

I have read (not studied) most of the material attached to your December 1981 letter. My ideas are changed but little. Eliminate some of the administration "fat" and we would have an affordable operation in aviation meteorological services.

The assigning or contracting for meteorological observations hasn't worked. I look forward to technological advances when "robots", (the latest buz word) or automatic stations can take over. Flight Service Stations are being closed before automations are operational. Pilot briefings are mostly by telephone and are coming from widely dispersed centers. Ceiling and visibility data are more scarce because of the closings. Radar is compensating. I suppose in 5-years telephone and a hard copy machine will produce the data and forecast for fliers. Real time depiction of radar, ceilings and visibilities via print out are probably on the horizon. One or two companies tried the enroute telephone data information service for a fee in a recent period but they evidently went broke. Of course, there was some direct government competition.

Good luck on your missionary work. I admire your pep. Keep it up.

Sincerely,

Larry

Lawrence A. Schaal
State Climatologist

LAS/cmc

Life Sciences Building
West Lafayette, Indiana 47907

PURDUE
UNIVERSITY DEPARTMENT OF AGRONOMY

October 26, 1981

Prof. Amos Eddy
Department of Meteorology
University of Oklahoma
Room 219
200 Felgar Street
Norman, Oklahoma 73069

Dear Amos:

Thank you for your phone call October 16, 1981, indicating that it is likely that the OSU AES Director will name you as the Oklahoma member on the new Southern Regional committee (SAW-81-02) on weather and agriculture. This is either indicative of your excellent program and extension relations with OSU or the AES Director's magnanimity, or both! I believe they need a few SC types on the committee, and certainly Boyd Post (CSRS) and I are pleased to see this committee under way to complete the regional coverage of the U.S.

Also, thank you for the information on the National Advisory Committee on Oceans and Atmospheres (NACOA) meeting on November 2, 1981 to discuss a proposal to make the National Weather Service into a giant corporation which, like the Post Office, will charge the public for its services, including those for agriculture and aviation. Without knowing more about just what public forecast, current weather and climate information would still be distributed (?) "free" under the corporation arrangement, it is difficult to be too critical or helpful to you in assessing the impact of the corporation proposal upon agriculture. From his extension activities, Jim Newman believes that agribusiness and many big farmers are already obtaining a good deal of weather and climate information from private sources. I am happy that you have been invited to attend this NACOA meeting, because I am afraid that our national weather information policy is being formulated by meteorologist-atmospheric science research types separated from the real needs for weather and climate information.¶ Harold Reetz, our Purdue agricultural extensionist in crop production (including weather-crop modeling), has written a statement on agriculture, and Larry Schaal has written one on aviation. Both of these are off the top without knowing anymore than the opening sentence of this paragraph. I really believe that some minimum "free" public weather forecast and climatological information service should continue under the sponsorship of the federal government. We have only to look at the increasing divergence in the state climate programs after the termination of the federal SC program — ranging from some improved state programs to no programs — to see what could happen if all services went commercial. It will be the small farmer — and probably all citizens — in the states with no services who will be harmed.

Life Sciences Building
West Lafayette, Indiana 47907

Does the corporation scheme include the observations? I believe we should look at the whole spectrum of weather services, from the observations (which may be most important in pilot briefings and now-time agricultural decisions) through the forecast to long range climatology. Rather than give too much individual opinion, however, you may want to quote portions of NRC reports. In the 1976 Climate and Food NRC report, "... major cause of season-to season variation in food production is the fluctuations of weather and climate". Our weather and agriculture are probably our best weapons in any cold war and certainly in the balance of payments. Maybe we should fund this under defense! In the NAS, NRC BARR report (1980) on "Weather-information systems for on-farm decision making", a fundamental base for the recommendations (p. xiv) was: "Because food, feed, and fiber production are national and international resources and weather forecasting requires global information, the provision of basic weather data and related information services for agriculture should be primarily a federal responsiblity. If this responsibility is not specifically mandated, it should be accepted as if it were".

Several things became apparent at a workshop at Madison, Wisconsin, October 12-14, 1981 to examine the federally financed surface climatological data network. Although most of the "climate" money is spent on satellite and radar measurements (say $135 million/year), it is the climate information from the surface climatological networks ($2.5 million) which continue to service the national needs in engineering and construction, agriculture, and industry for planning and operations. No one seems to want to pay for these networks (Decker, 1980, Proc. Weather and Agriculture Symposium at Kansas City), yet everyone needs the data. At the Workshop Peter Leavitt (Weather Services Corp.) said he did not object to user charges, but certainly TELCO the largest profit-making firm using weather information, should also have to pay. I assume any charges will be passed on to the public, but perhaps those using the information most should have to pay most.

It seems to me that to maintain some semblance of uniformity and efficiency in collecting, quality control, disseminating, and archiving weather and climate information for easy access, there should be basic minimum services with federal guidance, but with cost-sharing between the county (or city), state, and federal governments from the observational network base to the forecast and climatic applications. Beyond this (?) the user should pay.

Good luck.

Sincerely,

Robert F. Dale
Professor of Agronomy for
Agricultural Climatology

RFD:er

cc: Dr. Boyd Post, CSRS

PURDUE UNIVERSITY inter office memorandum

To R. F. Dale
From H. F. Reetz Harold
Date October 21, 1981
Subject NACOA proposal to charge for NWS Services

Thank you for calling this question to my attention. I am concerned about the proposal to make NWS a corporation like the US Postal Service. While they are no doubt strained financially like most other public agencies, I question whether this is the best solution.

My feeling is that the collection, storage, and manipulation of weather data is a very basic resource for many areas of agriculture, both public and private. If it were to be put under a corporation control, some safeguards would be needed to ensure that these data bases were maintained.

I am afraid the potential revenues generated from the agricultural uses would be insignificant relative to aviation and other industries who can pass the expense along to their customers. Consequently ag weather data bases would run the risk of being phased out.

Perhaps a compromise could be worked out, whereby a basic data series could be maintained by NWS along with a fixed level of public services. Then charges could be levied against users of additional special services to help offset the costs of the overall operation.

This might provide for continuation of existing services to producers through NWS and the Extension Service. Additional services for larger corporate users who use these data to make crop forecasts for sale (Weather Services, AGSERVE, EARTHSAT, etc.) might be provided on a fee basis.

It seems to me the administration of charges for such services to producer users would develop more overhead costs than could be paid from reasonable revenues.

HFR:pdr

CC: M. W. Phillips

COMMENT CONCERNING THE TRANSFER OF SOME FEDERAL SERVICES IN AVIATION TO A CORPORATION ORGANIZED FOR THE PURPOSE

It is the opinion of this commercial license pilot (instrument rated), and a member of the International Flying Farmers Organization that pay-as-you-go services in aviation, being considered to reduce federal expenditures, would tend to reduce safety in flying but not catastrophically.

Consider publications. Jepsen Charts (private company) competes with National Ocean Survey (NOAA) in producing and selling Instrument Approach Charts. The pilot fraternity is split on which has the best presentation. The Aviation Information Manual published and distributed by the Supt. of Documents is used by a low percentage of pilots. Reasons are several: Hard to locate and buy. Subscription service terrible. The Federal Aviation Administration does the basic work for chart and publications data which would be hard to replace.

As to communications services in conducting flight plans, distributing weather information, and help during enroute flying, it would seem very difficult to give this to private enterprise. The best savings would be to delete a preponderance of overhead administration that forms during good times and let the fellow providing the services at the grass-roots level go ahead and get the job done. The first economy wave hits the working bees, and the multilayered administrations survive in good numbers standing by for the next escalation of the bureaucracy.

If these services to aviation revert to private enterprise, leave them largely unfettered and unsheltered. Don't give them the protection the post office has in handling first class mail. After all, history shows that many of these services were initiated by individuals and their companies. The government stepped in later.

Lawrence Schaal
State Climatologist,
Commercial Licensed Pilot,
and Director Indiana Flying Farmers

KANSAS STATE UNIVERSITY

Department of Physics

Cardwell Hall
Manhattan, Kansas 66506
913-532-6786

December 8, 1981

Dr. Amos Eddy
Oklahoma Climatological Survey
710 Asp, Suite 8
Norman, OK 73019

Dear Amos:

I appreciate your asking my opinion on the NACOA options prior to your appearance before the hearing on the subject. It does seem difficult to get across a relatively straight-forward message to the National level. We must keep trying I guess. The hardest part in presenting a case is to recognize that the things we've been saying for the last 10 years have not been heard, and that we need to present the same material again. Often it is frustrating to try to think up "something new" when in actuality your listeners are still on square one. I give you encouragement and hope for your success.

I hesitate to place the National Weather Service in the same category of inefficiency as the Post Office. However, they do suffer from too many administrators and too much structure to get things done on a cost-effective basis. I am leary that option 3 will be a cure for this. I would think that they will keep all top-level personnel to handle their functions and rely on the private sector to pick up the actual workers. I'm skeptical that there will be much dollar saving or improvement in quality. Everyone wants to have computers, satellites, and radars and no one wants to take care of the max-min thermometers and rain gage--even though they probably generate the most useful information of any instruments.

I would summarize my feelings as option 4. Maintain the current federal programs of data acquisition, computer forecast products, and severe weather warnings. Note: in some cases this means an increased effort in the area of data quality.

Rely on the private sector to provide an increasing role of forecasting to groups who have need for specialized interpretations of the weather. This group would be expected to pay for data and map products beyond the cost of dessimination that they now pay.

Establish a cooperative cost-sharing program with the states to provide climatic data and information to their local level with some sort of guidance to provide for a uniformity of services.

I hope that we will be kept posted about the outcome of these hearings. You should convey the idea that we in the states have a real interest--and stake--in the decision to be made.

Sincerely,

Dean

L. Dean Bark
Professor of Physics

LSB:skc

UNIVERSITY OF KENTUCKY
COLLEGE OF AGRICULTURE
Lexington, Kentucky 40546

COOPERATIVE EXTENSION SERVICE

RESIDENT INSTRUCTION
AGRICULTURAL EXPERIMENT STATION
COOPERATIVE EXTENSION SERVICE

DEPARTMENT OF
AGRICULTURAL ENGINEERING

October 20, 1981

Mr. Amos Eddy
Oklahoma State
Climatologist
815 Jenkins Street
Norman, OK 73015

Dear Amos:

I was very pleased to discover that an organization was archiving weather observations of the Southern United States, independent of the National Climatic Center. As you obviously realize, timely access to this data is very important, especially at a reasonable cost.

I would be very interested in having access to the data to ensure that researchers at the University of Kentucky have fast and low-cost turn around time of weather data in the Southern United States.

Sincerely,

Tom Priddy

Tom Priddy
Agricultural Extension
Meteorologist

KTP/nmr

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UNIVERSITY OF KENTUCKY, KENTUCKY STATE UNIVERSITY, U.S. DEPARTMENT OF AGRICULTURE, AND KENTUCKY COUNTIES, COOPERATING

After considerable thought, I have the following comments concerning the question, "Should (Agricultural) weather information be totally provided by private vendors?" I will answer this in terms of the importance to agricultural weather, as this is my field of expertise.

All farmers can get a weather forecast from their local radio station. This is one of radio's unique abilities - to pump weather information out to the user. Interpretation is still left to the user. The value of that information is a function of: a) How the radio disseminates the information (i.e., positive or negative) b) the users understanding of the weather information (i.e., forecasts, radar summary, etc.) c) the users understanding of weather in general d) the importance of the particular operation to be conducted. In essence, education and communication plays a large part in the value of weather information to a user.

For several years I've worked on federally funded projects using weather information supplied by the National Weather Service. Specifically, I worked on Project "NOWCAST" out of Colorado State University, and Project "GREEN THUMB" out of the University of Kentucky. Both of these projects used National Weather Service information, but the difference was the manner in which this information flowed or was disseminated to the user. In NOWCAST, the agricultural weather information used Educational Television as the solution to improve dissemination techniques. Agricultural weather briefings were to be provided hourly throughout the day. The GREEN THUMB system transferred weather inforamtion (maps and forecast, plus market and extension information) via a box hooked up to the users telephone and television.

In both projects it was believed that improved dissemination reduced the uncertainties of the decision-making process as related to weather. Project NOWCAST did not test this hypothesis in a pilot test. However, Project GREEN THUMB has been tested for over two years and final results addressing this and similar questions are soon to be released by Stanford University.

Preliminary results indicate that most farmers liked the service but only the larger farming operations may have profited from the service.

Questions raised by these tests were: what percentage of farmers would be willing to pay for a service of tailored agricultural weather information when many don't know how to use the free information they're already getting? Is that percentage large enough to warrant a complete turn-over of weather services to the private vendor? If that percentage were large, why hasn't there been a "mad rush" of private vendors into the field of agricultural weather briefing services?

In my opinion, there is a large enough percentage of users that would subscribe to weather briefing services given better education concerning how to use the information, and given a system that did improve the flow of the information in a visual, textual and interpretive format. In addition, I believe the "mad rush" of private agricultural weather services has NOT occurred because in the past there has not been a satisfactory system that actually improved the flow of information.

However, there does seem to be a movement by many land-grant colleges and some private organizations towards the Videotext system. I think this is a good approach to a solution of the problem. If there is a market the vendors will go after it.

Other considerations: If private vendors maintain the National Weather Service data base, how will the data base of weather observations be affected?

Will weather observations still be shared? Will the National Climatic Center still function?

I would be very concerned about the homeogeneity of the data base if private vendors had control.

In summary, I believe there is value in providing timely, well-tailored agricultural weather to United States farmers. But I am concerned about the educational aspect - will vendors improve the information to the point that value increases to warrant all weather services being maintained by those vendors? What effect would private vendors have on the current National Weather Service weather observations?

After lengthy thought I would not recommend a transfer of United States Weather services to the private sector for the above mentioned reasons.

Tom Priddy
Extension Meteorologist
in Agriculture
University of Kentucky

Tom Priddy
Extension Meteorologist
in Agriculture
University of Kentucky

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF AGRICULTURE

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DEAN PRIDGEON, Director

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December 23, 1981

Prof. Amos Eddy, Director
Oklahoma Climatological Survey
710 Asp, Suite 8
Norman, Oklahoma 73019

Dear Amos

Thanks for the information on the NACOA issue paper and related materials. I had been hearing about the issues but this is the first time I have had the opportunity to review them.

I agree with your assessment of option one. Since status quo implies continued decline in funding, information and services, this is an unacceptable option.

Option two, without a reorganization of the Atmospheric Sciences portion of NOAA, would probably mean no net change. It would be only a shifting of the funds replaced by fees over to the Oceanic Sciences and Satellite research components. I do not believe a fee system would generate enough revenue to support satellites and the large-scale research efforts.

In Mr. Almazan's comments, the implication is that non-federal providers of forecasts are completely independent of the NWS. Everyone involved in "weather" knows this is not so because of the basic observations required for the process to work. I get "nervous" when I think of staff people, who may not realize these connnections and dependencies, making recommendations that cost everyone considerable time and effort to combat and correct.

I have some strong reservations about option three with respect to climatological data collection, information and services. Throughout the various discussions, the emphasis is on forecasting as if that's all the NWS and the new "organization" will be collecting information to support. In my opinion, that's exactly what the NWS would like to do and rid itself of the cooperative network which is the backbone of climatology. Even in Mr. Almazan's comments, the only time I found climate mentioned was in the statement of the option. After that, all references were to weather service(s). I have believed for sometime that the wrong agency is running the climatological data network. In theory, the NWS should be interested but in actuality the interest wanes significantly. This may be in part due to the fact that NWS makes very little use of the data collected. Another reason may be the 19th century method of getting the data to the NCC and the extreme delay in getting digitized data, e.g., July or August of the subsequent year before any data are available -- 18 months after January data were delivered. I agree whole-heartedly with the second point of your summary, "The integrity of the data base must be maintained and enhanced." I would add the qualifiers of "both weather forecast and climatic data bases" so there are no misunderstandings concerning the two. Both are very important but for different reasons and basically to different clientele with some overlap.

It is essential that those of us in the applied climatology area do not stand by quietly while others destroy the basis for operations either by neglect, ignorance, or design. Future activities can not be the same as the past, but let's all work toward a mutually workable solution that involves federal, state, academic and private interests. No one segment can just take without providing something in return.

I hope my comments will be helpful in this matter.

Fred V Nurnberger

Fred V. Nurnberger, Ph.D.
State Climatologist
MDA/Weather Service

FVN/mo

STATE OF
MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
Room 279, North Hall, U of Minnesota, St. Paul, MN
PHONE NO. 612-296-4214
FILE NO.

December 18, 1981

Dr. Amos Eddy
University of Oklahoma
Room 219, 200 Felgar
Norman, Oklahoma 73069

Dear Dr. Eddy:

Reference is made to the NACOA Issue Paper. It is difficult for me to select Option 1 or Option 2, however, I personally feel we are not ready for Option 3 at the present time. Option 1 will work if we put monies into service rather than the bureaucracy.

I personally favor Option 2 because the public and private sector requires certain weather services today. I feel the Federal Government cannot provide a salable product today to the user. To prove my point the Federal Government delivers weather data weeks after a request, in fact it can take more than one year to obtain hourly precipitation data today.

If the Federal Government is to be successful in Option 2, it must provide timely and reliable observations and computerized data on a rapid communication system in order to give the public and private sector a desirable product.

Further, there is a need also to update the local forecasting service. Forecasters need to analyze data within their area by using their own models. This means access to or in house computers and also up-grading the forecasters and/or acquiring personnel with such skills. Lastly pay them for service rather than transferring them into the bureaucracy.

Sincerely,

DIVISION OF WATERS

Earl L Kuehnast
Earl L. Kuehnast
State Climatologist

McQUIGG CONSULTANTS, INC.

310 TIGER LANE • COLUMBIA, MISSOURI 65201 • OFFICE 314-445-7515, HOME 314-445-2055

21 October 1981

Dr. Amos Eddy
The University of Oklahoma
Room 219, 200 Felgar
Norman, Oklahoma 73069

Dear Amos:

I understand that you will be appearing as a witness before a Congressional Committee, considering the possibility of established a government corporation to operate the facilities of the national weather service, and some allied activities.

I have been concerned for several years with the apparent decline in the quality and reliability of the daily flow of weather data, both from the United States and from other countries. About 15% of the reports from USSR stations are missing on a typical day. Reports from countries such as Argentina miss the transmission on the circuits available to my office more than 15% of the time.

We have not been able to ascertain whether the missing reports are due to failure of the originating country to include them, or whether the communications center in the Washington, D.C. area failed to include them on the data relayed through that facility.

The flow of weather data from around the world has very large potential value, when it is interpreted in terms of grain yield and production. The situation the last three years in the USSR is a prime example.

If the proposed mode of operation of the facilities of the U.S. national weather service would result in improvements in the amount, quality and reliability of weather data from this country and from around the rest of the world, and if this could be done with substantially lower administrative overhead costs, I would be in favor of the change.

Sincerely,

James D. McQuigg

James D. Mc Quigg

UNIVERSITY OF MISSOURI-COLUMBIA

College of Agriculture

Department of Atmospheric Science
701 Hitt Street
Columbia, Missouri 65211
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December 28, 1981

Dr. Amos Eddie
Director Oklahoma Climatological Survey
7100 ASP, Suite B
Norman, Oklahoma 73019

Dear Amos:

I certainly appreciated receiving a copy of your discussion presented to NACOA in September 1981. I found your discussion quite interesting and enjoyed reading the comments from those providing you with their appraisal of issues surrounding the organization of our National Weather Service. There should be considerable input into the discussion of these important issues.

Unfortunately, I do not agree that a "quasi-governmental corporation" would satisfy the needs of the public in the United States for a weather service. This negative response probably comes in part from a reaction related to my overall political philosophy, but there are real doubts concerning the technical evaluation of the proposal. I believe that most public service concerning weather information should be offered on a "cost free" basis. The identification of the nature and extent of these "for free" services must be made on the basis of the needs for public health, public safety and the importance which the industry receiving the weather service is to the national welfare. Although there are probably many industries falling in this essential category, I am mostly concerned with agriculture. There are also needs raised in the transportation industry, "particularly aviation", which require considerable free governmental input.

The formation of a quasi-governmental corporation (I suppose something like TVA) is, to me, a major governmental cop-out. There is no inherent reason why such an organization would be any more efficient than a governmental agency. Rather than providing politicians and government planners with a new format of organization, it would be better to encourage them to provide the support necessary to operate a first class national service agency for weather information.

Thank you again, Amos, for allowing me the opportunity to give you these comments. I hope that you will find them useful.

Very truly yours,

Wayne

Wayne L. Decker
Department Chairman

WLD:jr
cc Bernie Dethier, President
State Climatologist Association

an equal opportunity institution

October 28, 1981

Dr. Amos Eddy
State Climatologist for Oklahoma
University of Oklahoma
710 Asp
Norman, OK 73019

Subject: Marketing Weather Data for the Agricultural Community

Dear Amos:

Economists involved in a quantitative analysis of the US agricultural industry are primary users of community weighted weather information for three main reasons. First, econometric quantification of yield equations both for crop and livestock are highly dependent on an appropriately weighted variable that adequately reflects the impact of weather on this commodity. In the case of crops, for example, three pieces of information normally associated with yield must be unraveled. These include economic price signals, weather and technology.

Unfortunately, in econometric analysis if data for any one of these variables is not appropriately derived then coefficients will necessarily be biased and for this reason give an erroneous signal of corresponding impacts. Thus, the research component of agricultural econometric models is dependent on the appropriate quantification of weather indices that reflect the geographic dispersion of crops and livestock.

Major users of this type of data would be land grant and other universities involved in research on the production side of the agricultural equation. The second group or body of users of weather information is the segment of the economy associated with outlook or forecasting. This may be encouched in several industries associated with the agricultural sector. Knowledge of variance of weather in conjunction with some expected norm is a strong force in leading a farmer to a production decision amongst several types of crops. Also, upon harvest a crop must be marketed. In this event some risk preference is strongly conditioned by weather expectations. A strong upcoming or new crops will mean lower prices, whereas an expected short crop will mean higher prices. A marketing strategy will be conditioned upon the amount of risk a grower can take in terms of expected future supplies and other related forces that influence price movement.

The equipment industry and banking community serving agriculture are also prime users. A decision to build another plant are risks associated with farm loans are conditioned on long term price expectations. Changes in weather patterns --- more variability or longer term cycles in weather often play a role in these decision processes. In some areas, one poor season in 5 is considered norm. Obviously the frequency of these poor seasons implies spending or purchase power and the loan repayment.

Direct trading in future markets are also areas where information on crop production is of significant importance. Monthly surveys by USDA are reported during the growing season. The variance around these production estimates are rather large at the beginning of the growing season. For example, early summer estimates from 1980 implied a strong crop with low prices. However, a long hot July reduced actual production with corresponding strong price impact. The reverse occurred in the summer of 1981. A marginal crop expected in early June stimulated forward price expectation. But extremely good weather in most areas during the summer resulted in a record crop with expected low prices.

Many firms are actively involved in collecting weather information during the growing season to obtain additional information on the direction the crop is likely to take. These firms include major equipment, fertilizer, pesticide, herbicide, processing and transportation companies serving agriculture. The audience in this case is very large.

The third group is the US government. Weather data is an essential ingredient in management of the farm reserve program by the US Department of Agriculture. This program is designed to maintain an average level of reserve for major commodities that will keep prices in a desired range. The size of this reserve is conditioned on the desired price range and the amount of normal variance associated with supply and demand in the industry. A significant amount of this variance is associated with weather related production, indices are necessary from both the domestic and foreign market.

Some progress has been made by the USDA in collecting weather information. Very little progress has been made in aggregating these data for all purposes outlined above.

Abner W. Womack
Professor of Agricultural Economics
University of Missouri-Columbia

TEACHING RESEARCH EXTENSION
Institute of Agriculture
and Natural Resources

THE UNIVERSITY OF NEBRASKA-LINCOLN
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CENTER FOR
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Reply to:
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Telephone (402) 472-3679

December 8, 1981

Dr. Amos Eddy
Oklahoma Climatological Survey
University of Oklahoma
710 Asp, Suite 8
Norman, Oklahoma 73019

Dear Amos:

I have reviewed your "...Analysis of Three options..." and the supporting comments of others interested in weather services. It seems the ground was well covered by those you querried intitially, although I will add a few comments.

First, it is good to know that the State Climatologists will be represented at this meeting of the National Advisory Committee on Oceans and Atmospheres (NACOA). When considering the option for a quasi-governmental agency, I feel public opinion is an important element to consider. Lately, I hear less about the waste in government although attacks on the postal service are still common.

If the nation's weather services were to be provided in a framework outside of the Federal Government then fees must still be kept to a minimum. This could prove difficult because unlike many private industries there would be no competition for services provided. Competition could easily eliminate the uniformity needed to deal with our weather data collection and analysis on a national scale.

Each new administration brings a different attitude toward federal services. Looking at the need for weather services over a long time span one might pose the question, what type of support would be most stable? For instance, user fees might drop off considerably during an economic crisis. The Federal Government should provide support for the basic data acquisition and processing and a minimum level of services. Beyond this, charging the user might be acceptable.

Best wishes.

Sincerely,

Kenneth G Hubbard
Kenneth G. Hubbard
State Climatologist

KGH:nkb

THE UNIVERSITY OF NEBRASKA-LINCOLN THE UNIVERSITY OF NEBRASKA AT OMAHA
THE UNIVERSITY OF NEBRASKA MEDICAL CENTER

NEW MEXICO DEPARTMENT OF AGRICULTURE

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January 4, 1982

Dr. Amos Eddy
Oklahoma State Climatologist
710 Asp, Suite 8
Norman, OK 73019

Dear Dr. Eddy:

I appreciate your request for comments on an analysis of three options for the Provision of Weather Services in the NACOA issue paper of September 15, 1981. I concur and endorse the items which were addressed in the workshop that NACOA sponsored for the House Subcommittee in February 1979, and recommendations given in the 8th Annual Report (June 30, 1980).

There are a number of questions that must be answered before anyone can reach a definite conclusion as to the pros or cons of this change.

I am firmly convinced that the private sector is achieving large in-roads in supplying data in the direction that the crop is likely to take. In this view then NWS could close some of its facilities since it would be specialized and taylored to individual needs, thus duplicating efforts.

It is imperative that good quality data semblance be achieved with a central organization to distribute weather and climate information to its users. The current administration policy is allocating costs to its constituents, beyond this need, the user should pay.

As you are aware, we are in the process of hiring a state climatologist which will improve our capability in this general area.

Sincerely,

W.P. Stephens

William P. Stephens
Director

WPS/wpc

North Carolina State University
School of Physical and Mathematical Sciences

Department of Marine, Earth and Atmospheric Sciences
(919) 737-2210

Box 5068, Raleigh 27650

December 15, 1981

Dr. Amos Eddy
Oklahoma Climatological Survey
710 Asp. Suite 8
Norman, OK 73019

Dear Amos,

This letter is in response to our recent telephone conversation concerning the NACOA Issue Paper.

I think that Option 2 will not work. Option 3 is attractive; however, I would need much more information about how this corporation would work before I could support it. Many questions need to be addressed:

> Who runs the corporation? Is it truly private with no connections to the U.S. Government? If so, who would monitor its activities? It would be a monopoly?! If there is a connection to the U.S. Government what form would it take? Could it really be more efficient on a national level than the current system? Who pays the bills?

Clearly the present state of affairs is not serving the needs of many segments of the economy. Agriculture is being served to some extent but there are many additional ways available to aid the farmer. Service to marine weather users is in even worse condition (see enclosed report). My conversations with NWS people indicate that they clearly recognize these deficiences and desire to eliminate them; however, personnel and budget restrictions prevent even the most dedicated people from improving existing services. In many respects, I would like to see the solution to the service problem implemented within the present framework. I fully realize what a monumental task this would be. Has NACOA estimated the cost of such an improvement? Is it going to be considered? Is it worthwhile to consider it?

I hope these comments have been of some help to you.

Sincerely,

Jerry

Jerry M. Davis
Associate Professor of Meteorology

JMD/ba

KTVY
500 East Britton Road P.O. Box 14068
Oklahoma City, OK 73113 405/478-1212

October 27, 1981

Dr. Amos Eddy
Oklahoma Climatological Survey
Norman, OK 73019

Dear Dr. Eddy:

The National Weather Service (NWS) has indicated a desire to eliminate some of its current activities and let private companies continue these services. In reference to this, let me pass along some of my thoughts on the subject.

Recent cutbacks in manpower and budget will make this a necessity. The NWS cannot continue to provide the services it has in the past without a serious deterioration of the current products. However, there are several services that must be maintained by the government. These services include data acquisition, disseminating all warnings and watches, providing numerical products, and issuing general public forecasts.

Of these activities the data acquisition is most important. The observations that are collected are the basis for forecasting. To insure that they are accurate and reliable, they must be under the supervision of the NWS and availible to all for forecasting purposes. Indeed, the data acquisition system needs to be expanded and improved. Today, there are serious gaps in the reporting network that need to be filled with at least a remote station. Also, the accuracy of the reporting stations needs to be improved to eliminate bad data which can be a problem in severe weather situations.

Over the past decade the number of private corporations in weather has significantly increased. Many provide some of the services already provided by the NWS. However, most of their activities are in areas not currently serviced by the NWS. With the planned cutbacks, the activities of private corporations will be on the increase and there may be another inrease in their numbers.

Private corporations have been valuable, because of the tailored information they provide individuals and industries. However, their services are of a specific nature. The NWS must maintain all services pertaining to the general public. This is a necessity in order to provide a consistent and reliable product.

The recent cutbacks in the NWS are a very serious matter, because they threaten the integrity of the entire system. The deterioration of its services are not in the public interest. Therefore, very careful consideration must be given to which services are most important to the general public. These are the services which should be retained and improved.

Sincerely,

Jim Gandy

Jim Gandy
Staff meteorologist

weatherscan
INTERNATIONAL

October 26, 1981

Dr. Amos Eddy
Oklahoma Climatological Survey
815 Jenkins
Norman, Oklahoma 73019

Dear Amos:

I appreciated your call concerning the study to incorporate the National Weather Services.

There are a number of questions that must be answered before anyone can reach a conclusion as to the advantage or disadvantage of this change.

The private sector can take over many of the current specialized functions of the National Weather Service, but this is a two edge sword. The private sector has no set of regulations or definitions governing the practice of Meteorology. Anyone with an interest in Weather can start a private firm. As the National Weather Service reduces its services, the private sector must adopt a more stringent code to practice private meteorology.

The major concern of the wholesale/resale concept is the regional difference in cost of receiving NWS data. A uniform pricing should be adopted so that a company in Salt Lake City will pay the same as one located in Washington, D. C.

The National Weather Service should retain the responsiblity of issuing the official Watches and Warnings of extreme weather conditions to the general public.

I realize that the above is only a few of the observations that could be made. Once the committee recommends the form and function of the "Corporation" then a more definitive list of comments can be written.

I have enclosed the list of Contracts the NSF has awarded this year. I would appreciate your comments about the meeting upon your return from Washington.

Sincerely,
WEATHERSCAN INTERNATIONAL

Ross

Ross J. Dixon
Certified Consulting Meteorologist

Enclosures

RJD/jaw

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THE WEATHER STATION, INC

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P. O. BOX 5748
NORMAN. OKLA. 73070

October 19, 1981

Dr. Amos Eddy
Oklahoma State Climotologist
Norman, OK

Re: Future Weather Service to the Public

Dear Dr. Eddy:

I welcome the opportunity to contribute to your presentation regarding the optimum role of NOAA in providing the weather information the country needs.

First, it should be clear that the need for weather services is rapidly increasing. As activity in the transportation, construction, agriculture, utilities, and other industries increases, we in the meteorology business are called upon for more and more information. One result of this increasing interest is the recent proliferation of private companies offering weather forecasts.

The claim that private enterprise is more efficient than government agencies is often heard. The claim is verified in the case of weather service by the fact that several National Weather Service observation facilities have recently been taken over by private contractors, with cost the primary motivation.

If the burden of forecasting the weather for the public were transfered to private companies, the cost would certainly decrease. But can the private sector handle the job? The number of companies employing qualified meteorologists is rapidly increasing.

Our company, The Weather Station, Inc., was formed in September, 1980, and now employs 25 people, including twelve with meteorological training and education: nine with undergraduate degrees in meteorology, five with master's degrees, and one Ph.D. Within the next year, we intend to hire at least 25 additional meteorologists. We have applications from 68 meteorologist who have undergraduate degrees, and about 20 who have master's degrees.

The Weather Station operates nationwide and serves the radio, television, and transportation industries. We plan to provide weather service to a very wide range of industries in this and other countries.

The need for weather service beyond that now provided by NWS is widely recognized, and is our source of revenue. If NWS activities remain as they are now, private companies will expand the weather services rapidly in the next few years, in response to the demands of industry. If NWS activities decrease, the private sector is ready and able to take over the burden.

Page #2
Dr. Amos Eddy
October 19, 1981

The quality of weather services done privately would certainly exceed those of a government agency. Free enterprise is much more likely than government to employ the best-qualified people, and profit is the best motive to generate timely solutions to problems. The needs of industry will get more direct and immediate attention in a profit-motivated situation.

If the congress plans to decrease the services of NWS, they should certainly consider whether capable private companies are prepared to assume the jobs to be left undone. The Weather Station wishes to be counted among those with hand held high - prepared and willing to forecast the weather for the public as well as it can be done.

Sincerely,

Thomas Baxter

Tom Baxter
President

TLB/jw

DEPARTMENT OF ENVIRONMENTAL SCIENCES
CLARK HALL . UNIVERSITY OF VIRGINIA . CHARLOTTESVILLE . VIRGINIA . 22903
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December 31, 1981

Dr. Amos Eddy
Oklahoma State Climatologist
815 Jenkins Street
Norman, OK 73015

Dear Amos,

Thank you for soliciting my comments on the NACOA issue paper "The Provision of Weather Services to the Nation". I agree with you that the issues involved are both important and complex, and that any final resolution should only be implemented after very judicious consideration.

My experience as Virginia's State Climatologist leads me to support a two-level approach. Federal support should continue for data acquisition and analysis, the issuance of "general" wide-area forecasts, and for severe weather warnings. I believe a semi-public corporation would more effectively issue more specialized products, including local forecasts and those for industry and agriculture. In my opinion, these are currently inadequate.

I first direct my comments towards areas I think should continue to receive direct federal support:

- Acquisiton of real-time surface and upper-air information. I believe requirements for quality and uniformity dictate a federal effort here. In fact, the network should be expanded beyond its current state, in order to provide better resolution in the forecast models. Placing this service in the hands of a hodgepodge of private marketeers will most likely result in an increase in both systematic and random errors in important model initialization data, with highly negative results.

- The Federal Government should continue to actively support the running and dissemination of various forecast models. These are simply to complex and time consuming (requiring over an hour of dedicated time on large mainframes) to be reduplicated. I do believe that these products, especially the LFM and Spectral models, can and should be made available more rapidly than they currently are, via improved transmission capabilities. I believe these are highly cost-effective products, that should continue to be provided at with relatively little expense.

- It is essential that the Federal Government continue to support the dissemination of severe weather watches and warnings, including those for tornadoes, hurricanes, and flash floods. While these products are not always as specific as one would like, placing them into the hands of a multiplicity of private forecasters may dilute the necessary effect. As an example, consider the hurricane Camille situation on the Gulf Coast in 1969. If even one or two private forecasters had indicated it would not hit where it did, the number of people refusing to evacuate would have increased significantly. I believe it is fair to say that easily half of those who would remain at below 15 feet above sea level would have suffered significant casualities.

- The Federal Government should also support the continued dissemination of large area zone forecasts. While these are often too general for specific interests, they provide needed information at low cost for "casual" users.

As noted in the NACOA report, many of these services are becoming less labor intensive with time. I believe this will continue to be the trend, particularly as products become increasingly automated. Nonetheless, there will always be a need for much more specific forecasts, which should be provided by a "pay as you use" semipublic corporation. These would include the following:

- Local forecasts for counties and cities. In many areas, local conditions are so variable that the zone product may not be sufficient for those desiring "finely tuned" forecasts. The proposed corporation could contract with various private and state forecasters (in some cases, with employees of State Climatology offices) to provide this product. This will probably reduce overall costs, because not all localities or interests need be served.

- Agricultural and industrial forecasts. Value of this specifically applicable information is sufficient to justify payment by individuals or corporations who stand to profit from it. Experience with the "Green Thumb" project has shown that highly capitalized business operations tend to find these forecasts most useful.

This "two level" approach allows various states and localities to choose their own level of service, and the amount of support which they may want to contribute directly. These are important political and financial factors in the current climate.

I hope you will find these comments useful and constructive. If you want me to amplify further, please don't hesitate to give me a call.

Many thanks for your interest in my opinions on the NACOA report.

Regards,
Pat
Patrick J. Michaels
Virginia State Climatologist

cc: Bernie Dethier, President
American Association of State Climatologists

WESTERN WASHINGTON UNIVERSITY

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Office of the State Climatologist

7 December 1981

Dr. Amos Eddy, Director
Oklahoma Climatological Survey
710 Asp, Suite 8
Norman, OK 73019

Dear Amos:

Thank you for sharing your analysis of the NACOA Issue Paper. I hope the options and recommendations can be clarified before the end of the review period, but I fear there are many difficulties. Rather than attempt a detailed response, much of which would treat themes repetitively, I will offer a few brief comments. I suspect you will not wish to incorporate these directly in a formal presentation.

1. To maintain the status quo means continuation of a decline in quality and availability of services. I agree that Option 1 should be abandoned.

2. Option 2 cannot be administered fairly by the new and costly agency that inevitably would be required to oversee, regulate, and report.

3. If the three options outlined in the Issue Paper are the only ones open for consideration, I am forced to agree with your choice of Option 3 as the best of a bad lot. Unfortunately, we have ample evidence that a public corporation can be starved as easily as can a federal agency.

4. An effort should be made to consolidate the goals (purposes, objectives) of national weather and climate services. These should not be lifted wholesale from the so-called status quo and applied to another option, congressional mandates notwithstanding. In particular, a clear definition of "value" (of services) is needed. I suggest that there are criteria other than those advanced by economists.

5. The implication that business managers, applying business methods, can improve the efficiency of services should not pass unchallenged. Would the managers and methods be borrowed from Penn Central? Chrysler? Lockheed? Can we be certain that recurring recessions are caused by government inefficiency? How would the recall of faulty data and information be administered? If the government is inefficient, who will manage the Board of Governors?

6. The Issue Paper discussion of Option 3 makes scant reference to the role of the states. Would a state like Washington, which has given no support to a climate program, be treated as a "rural, sparsely populated area" and "guaranteed basic weather (and climate) services?" Or would citizens of states that refuse to fund data and information be denied services? Inasmuch as the National Climate Program has failed to resolve this problem, how would a "National Weather Corporation" handle it?

7. In contrast to the experience reported for Oklahoma, we have had a consistently high level of cooperation with the NWS. Admittedly, our technical capabilities and needs are considerably less than those in Oklahoma. A current minor problem involves the private sector. Whereas copies of monthly records of the NWS and FAA Flight Service Stations have been transmitted directly to the state climatologist, the records of a growing number of stations operated under private contract arrive only after a delay via the National Climatic Center. It may be that the currently unacceptable quality of contracted observations and records will be improved in time.

Whatever you can do to see that a message is sent to delinquent states from the highest professional and governmental levels will be greatly appreciated. At least in the State of Washington, the increasing requests for voluntary data and information services leave little time for repeated justification. My personal decision to cease volunteer service effective 30 June 1982 might be interpreted as support for user fees, but I believe there are some cogent arguments in favor of partial state funding.

Kindest regards,

Critch

Howard J. Critchfield
Washington State Climatologist

Mr. SCHEUER. Thank you very much, Dr. Eddy.

We will move on to Mr. Richard Ward of Ocean Data Systems.

STATEMENT OF CONLEY RICHARD WARD, VICE PRESIDENT, OCEAN DATA SYSTEMS, INC.

Mr. WARD. Thank you, Mr. Chairman.

I will neither raise the specter of unforecasted storms nor put on a hair shirt regarding user fees, and I will be brief.

I am a marine meteorologist with principally operational experience. I had 26 years in the Navy, forecasting in peace and war, and management of some Naval Weather Service activities. I am a recent councilor of the American Meteorological Society, and for the past 3 years I have worked as a meteorologist/oceanographer for Ocean Data Systems and its subsidiary, Global Weather Dynamics.

The company is located in Monterey, Calif. It is a small company which provides computer-based weather analyses, forecasts, and data services. We subscribe to all major national and international weather networks. We use our own computers to build our own data base and run our own forecast models. Our customers are commercial airlines, maritime interests, electric utilities, commodity traders, agribusinesses, commercial fishermen, and foreign governments.

I would like to jump backward for a moment and say that what the weather forecasting process requires is first of all that we determine the initial conditions. That is, we need observations. Then we can forecast the future. In order to forecast the future you need a forecast center, models, and computers. Then finally you must disseminate your products, so communications is very important.

Weather forecasting services may be considered to consist of warnings for the safety of life and property and public service forecasts—which really fit within one category—and special interests forecasts—specialized services—which have implied economic benefits. I think the National Weather Service priorities; that is, their mission priorities, should recognize these truisms.

The observing network is still inadequate, and correcting that is the most important first step. An adequate processing center for analyses and forecasts is the next priority. An adequate communications network is the next priority. Budget priorities should follow the mission priorities.

There are some specific questions addressed: What is the state of the art, and needs and opportunities in weather forecasting? Very simply I would say, to the state of the art question—we are no more than halfway toward our theoretical limit in forecasting accuracy. Our greatest need is more and better observations.

Mr. SCHEUER. What are the directions in which you feel there is great potential for improving our present capability?

Mr. WARD. Largely, weather forecasting is an initial value problem so we need more observations. Whether these observations are taken from the surface, aircraft, or satellite is important, and the mix of all these observations is very important. Given the initial conditions, then it is a question of having adequate computers and models to look into the future.

Our Nation's opportunity, then, for the National Weather Service, is to improve their severe weather forecasts, to acquire more powerful scientific computers, and to run better models. Addressing the role of the Government versus industry in providing specialized weather services—obviously the Government cannot be all things to all people so that it becomes a question of priorities versus resources.

In my opinion, the Government should focus on warnings and public forecast areas, leaving specialized weather services to be provided by commercial meteorological companies. Specifically, in response to your questions, I believe that private industry can and should provide specialized weather services to the marine industries.

User fees: I do not believe it is appropriate to charge user fees for warnings and I question the appropriateness of charging them for public service forecasts. For specialized weather services, I think fees are appropriate but they should be set at the marketplace rather than arbitrarily assigned by the Government.

The effect of the budget cuts on weather services: Remembering that I said the Weather Service requires an observational network, a processing center, and a communications system; we should recognize that in assessing budget cuts. Weather satellites for marine interests: We need at least two polar orbiters. One of our opportunities is to look to DOD for help here. We need five geostationary satellites and two polar orbiters.

The closing of 45 Weather Service stations: I do not know which ones are being proposed for closure. Closing one next to an already observing station would be of no consequence. Closing one that is unique, in a remote area, could be very significant.

Reduction of NEXRAD program: It impacts the basic observation and warning system and therefore I would not wish to see it slowed down.

Cuts in the satellite weather information system: I know nothing about it.

The background document that I got for this hearing indicates that it supports the basic mission—warnings and public service forecasts—of the National Weather Service, and to the degree that it does support that basic mission and does not duplicate already existing capabilities, I support the satellite weather information system.

Reduction in special environmental services: I support the reduction because I believe the slack can be taken by private industry.

Mr. **Scheuer**. Could we ask you to sum up?

Mr. **Ward**. Yes, sir. I think, in summary, that the National Weather Service should most importantly maintain and improve its observing system. The commercial weather service companies can provide specialized services if the National Meteorological Center will make the National Weather Service's computer output available to the private sector in order to promote the effectiveness and ability of the private services to efficiently serve the economic interests of the Government. Through this, the National Weather Service can improve our Nation's economy by levering their products through the private weather service companies, even while undergoing budget cuts.

[The prepared statement of Mr. Ward follows:]

TESTIMONY OF CONLEY R. WARD

Vice President

Ocean Data Systems, Inc.

and

recent member

Council of the American Meteorological Society

before the

Subcommittee on Natural Resources, Agriculture
Research and Environment
Committee on Science and Technology
U.S. House of Representatives

February 23, 1982

INTRODUCTION

Mr. Chairman, I am Conley R. Ward. I have just completed a three year term on the Council of the American Meteorological Society. I am also a retired U.S. Naval Meteorologist. My Naval experience includes several years of marine forecasting for naval operations and management of Naval Weather Service activities. In my final assignment in the Navy I commanded the Naval Weather Service.

I am currently a Vice President of Ocean Data Systems, Inc. (ODSI), and its wholly owned subsidiary, Global Weather Dynamics, Inc. (GWDI). ODSI is a high technology services company. We offer consultancy services in meteorology, oceanography, environmental satellites, remote sensing, and the computer and communications sciences. In these endeavors our clients come from the aviation and transportation fields, the offshore and maritime industries, utilities, agribusiness, and both U.S. and foreign governmental agencies.

Through our subsidiary, GWDI, we provide computer based weather forecasts, analyses and environmental data services to a broad spectrum of public sector and private sector industry areas with diverse operational requirements. We provide aviation route and terminal forecasts to airlines; marine forecasts for commercial shipping and offshore oil industry; load demand forecasts for electric utilties; crop related weather forecasts for commodity traders and agribusiness; fishery forecasts for commercial fishermen; and weather data services to a large group of clients.

We subscribe to almost all national and international weather data circuits and have our own computers and computer forecast and analysis models. We operate a dedicated transcontinental weather information distribution network. In short, we are very much in the commercial weather business.

QUESTIONS

What is your assessment of the state-of-the-art, the needs, and the opportunities in weather forecasting?

Weather forecasting is what we call an initial value problem. That is to say, the accuracy of a weather prediction into the future depends critically on the accuracy of the description of the weather now. If we can precisely describe today's weather as it exists now, weather forecasting technology allows us to forecast with substantial accuracy for periods of several hours for small-scale phenomena to several days for large scale systems.

Meteorologists have made tremendous advances over the last 20 years through weather satellites and improved communications. Powerful digital computers presently available, given correct initial values, permit us to compute with good accuracy, the mass and motion structure of the atmosphere out to 3 to 5 days. However, neither our models nor existing computers can get at the scale of individual tornadoes or thunderstorms. We can see dynamic situations conducive to the formation of these events on the computer produced prognostic charts, but we depend on actual observations from satellites, aircraft and observers on the ground to issue public warnings. Useful predictions of day-to-day weather changes are generally considered to have an upper limit of 10 days to 2 weeks. We are no more than half way to that limit.

The largest single need is improved observations to support weather services consisting of warnings, public forecasts and special interest forecasts. Throughout the whole of middle America, which faces the threat of loss of life and damage from tornados and thunderstorms, we operate a warning service supported by a World-War II vintage radar system. Power utilities spend millions annually in generating contingency power or maintaining natural gas pressurization because of future weather uncertainty. The density of weather observations required to reduce these uncertainties does not exist. Commercial airlines spend vast sums of money in added fuel costs and suffer lost passenger or cargo revenue because of inaccurate terminal and enroute wind forecasts. Neither the wind nor the weather observations are available in the density and detail required to support this industry. Farming efficiencies and crop yield forecasting depend critically on weather forecasting. Yet in our most vital farming areas, adequate weather and rainfall observations in real time are almost nonexistant.

Opportunities can be expressed in terms of responding to needs. We should continue to improve our forecasts of severe weather, not only to give the public greater warning, but also to minimize the economic loss and disruption caused by severe thunderstorms, blizzards, floods and snow storms. Our greatest opportunity in weather forecasting is first to continue to improve the quality and quantity of observations through remote sensing (satellites, aircraft and radar); then to improve the quality and timeliness of our numerical prognoses through better observations, more powerful scientific computers and better models; and finally to improve the utility of our forecasts through more accurate predictions, tailored services and effective product dissemination.

What is the role of government vs. industry in providing specialized weather services, especially marine weather services?

It is evident that the government can not be all things to all people. What the government should do then becomes a question of priorities versus resources.

When applied to weather services the priorities must be first to establish and maintain a basic weather support system consisting of an observing network, a processing center and a communications network so that weather services may be provided. Priority of weather services are first warnings, secondly public forecasts and lastly special interest services. The National Weather Service should apply its resources, and receive budgetary support, in a manner consistent with these priorities.

Especially in a period of limited availability of resources, the Government should focus principally on the warnings and public forecast areas, leaving the special interest services to the private meteorological industry. This industry, by adding value to the basic products generated by Government, can direct itself to the unique needs of special interest areas.

Private industry is fully capable of providing marine weather services to the offshore and fishing industries. The National Weather Service should not have any particular charter to involve itself in marine meteorology as a specialized service. The provision of specialized marine weather services outside the Department of Defense should be left to the private meteorological industry. The oceanic warning function could be handled by the U.S. Navy as a cost effective alternative.

What is the appropriate level of user fees for weather services, especially marine weather services?

The Government should not charge user fees for warnings nor public forecasts. User fees should, however, be charged for special interest services. In this instance, however, the user fees should be set by the market place. They should be competitive and mutually arrived at by the provider and receiver of the service. The level of user fee should be based on the value of the special interest service as perceived by the user to the user's operations and theprices that the providers of such services can afford to charge for the services and still make a reasonable profit. They should not be arbitrarily assigned by Government.

Meteorological companies themselves should however, be required to pay subscriber fees. These fees should be fixed and based on the incremental cost above what it costs the government to collect the data, and provide the information for warnings and public forecasts.

What will be the effect on weather services, especially marine weather services, of proposed budget cuts?

In order for a weather service to exist a weather service support system is required consisting of:

- an observation network
- a processing center (analysis and forecast center)
- a communications network

The existance of this system is a fundamental requirement for a weather service and the effectiveness of the service is limited by the adequacy of the weather support system.

Environmental satellites provide a large volume of the observational data. Indeed, over the ocean areas satellite data constitute the vast majority of the observations. A mix of 5 geostationary and 2 polar orbiting satellites is needed. I do not agree with the statement in the NOAA Budget Information booklet for fiscal year 1983 that a reduction of polar orbiting spacecraft from 2 to 1 still preserves an adequate level of remote sensing observations. The Department of Defense also has a polar orbiting environmental satellite program. The polar orbiting satellites are particularly important to an effective marine weather service. Reduction of combined DOD and NOAA polar orbiting satellites below 2 would have an adverse impact on the Nation's marine weather service.

The impact of closing 45 National Weather Service stations will depend on their function; if they are observing stations, their location and their proximity to other observing stations. If they are remote from other observing stations, closing them could result in loss of critical observations from the support system.

The impact of decreased level of funding of the NEXRAD program can only be properly evaluated in light of the total program. Since the greatest need is for weather warnings and NEXRAD will contribute directly to that capability, serious consideration should be given to restoring the cut in this program.

The proposed program increase to evaluate a Satellite Weather Information System (SWIS) is supported if it is designed to contribute directly to the National Weather Service's primary mission of warnings and public forecasts and does not duplicate already existing capabilities.

The proposed budgetary reductions in specialized environmental services are supported. Commercial weather service companies can and are willing to provide such specialized environmental services with value added enhancements. In order to facilitate the provision of weather services by commercial organizations the National Weather Service should make their processing center output available, on an incremental cost basis, to the private sector in digital form so the full value of the analyses and prognoses generated by the National Meteorological Center (NMC) may be realized throughout the economy. Adquate data communications interface equipment at NMC should be provided so that their computer products and data can be made available to the private sector companies on a timely basis. In addition, the Department of Defense unclassified weather circuit called COMEDS, should be made available to private sector weather service companies.

Through utilization of the National Weather Service products and their enhancement by commercial weather service companies in their role of serving business and industry, the increased economic benefits of using weather information can be achieved even though the National Weather Service budget is reduced. This means that even with a cut in their budget, the National Weather Service can make a more positive contribution to the Nation's economy by levering their products through the commercial weather industry.

Mr. SCHEUER. Thank you very much, Mr. Ward.

We will now hear from Bobby McKown of Florida Citrus Mutual. Let me state that our colleague, Congressman Andy Ireland from Florida, was very eager to be here and to introduce you, Mr. McKown, but he has been unavoidably detained so I am going to ask unanimous consent for his introduction to be placed in the record at the appropriate point. I am sure he would want that.

Therefore, let me introduce you. As you know, your statement will be printed in full at the appropriate point in the record.

STATEMENT OF BOBBY McKOWN, EXECUTIVE VICE PRESIDENT AND GENERAL MANAGER, FLORIDA CITRUS MUTUAL

Mr. McKOWN. Yes, sir. I thank you very much, Mr. Chairman. I am sorry that Congressman Ireland could not be with us at this time but I think it is very fitting that the Florida citrus growers, the farmers themselves, would be last on the program because we are at bottom line, the grass root element of all the work that you authorize within the Weather Service. It is there where the Weather Service is put to use, to the highest and best use for the benefit of our members.

We represent 13,245 citrus growers in Florida with an average size of 50 acres of citrus groves. There are 845,000 acres of citrus producing in Florida. Through 1981 and 1982 we have had back-to-back, devastating freezes. These two freezes have reduced our crop size from 206 million boxes of round oranges down to approximately 131 million, or a 75-percent reduction. If we had not had the Ruskin facility in place—we did have a tremendous loss—a greater loss in the crop of citrus would have occurred in Florida.

I also point to you that the cost-effective system at Ruskin of frost warning service is most important, and it is a cost-effective system of the dollars that you spoke of earlier, Mr. Chairman. We have 32 producing counties of citrus in Florida, basically from the northern tip of Ocala through the southern part of the State.

It is very important that when temperatures reach 28° to 26° levels, that we be advised of that, paricularly if it is going to be 4 hours or longer. From 4 to 6 hours, we sustain fruit damage; below that, for a longer duration, then we begin to have tree damage. This will certainly impact upon the economy of our State.

Small growers do not have a great number of elements available to them to control weather. However, by using the Ruskin facility information and detail that they transmit to our members, growers use flood irrigation methods, low irrigation, wind machines, grove heaters for cold protection. Energy is an important cost. Without the Federal frost warning service for citrus, then our growers cannot take chances. What would we do? We would fire, flood, irrigate, and utilize everything else without efficiencies because they could not take a chance without those data coming to them.

We have met with the private sector. We have talked to them. What they really want to do is give us long-range, monthly, weekly forecasts, with some limited dialog of data which we need in the time of a disaster or an oncoming freeze condition. That will not meet our needs. We must have the full scope of the narrative that the frost warning service now gives to our members, and they read that in detail to determine to the efficiencies.

They have also given us a quotation of the cost factor to be $35,000 to $45,000 just for a 2-month period. Then we have the problem of how we are going to communicate that to our folks.

We have also investigated leasing the Ruskin facility to our industry. We are talking, if we lease the entire facility with all those people and all the technology they have, in the neighborhood of almost $1 million. That is out of the question as far as we are concerned because we are a private voluntary organization. We do not have taxing authority to get funds from all people and yet it would be made available to all of the producers of Florida.

Mr. Chairman, I submit to you that we have already supported a reduction of 50 percent in the Ruskin facility, reducing the number of meteorologists from eight to four. We support that. We also supported reduced services at that 50 percent reduction level, thereby they would provide two shifts per day, 7 days a week, with meteorologists on board to issue those warnings and those data that are so vital to our industry.

Our industry is a $2.5 billion industry in Florida. We are the largest single agricultural industry. We keep 90,000 people gainfully employed and with our industry we provide the stability for the economy of our State. For every citrus dollar that is generated in the State of Florida we have a multiplier effect of $2.67.

Mr. SCHEUER. Did you say it is the largest industry in the State of Florida?

Mr. MCKOWN. Second, agriculture, but it is the second largest single industry, second to tourism. Of course, when you go into a recession like we have evidence of in the country today, then it plays a more predominant role in the stability of our economy of the State of Florida.

We do not believe the frost forecast service to be a direct support program for a single industry. It benefits all U.S. citizens because the well-being of the agricultural industry in Florida is of direct, major importance to hundreds of thousands of employees, not only in the fruit and vegetable industries but also to those whose livelihoods depend upon these industries.

I submit to you in closing that the fruit frost warning service in Florida has been a very timely mechanism that is cost effective. We are talking about, to cut out that program, $209,000 as we analyze the budget nationwide, for California, Texas, and Florida. If you divide that by the number of citrus growers alone, that gives you a very cost-effective means that would not be available to those small growers.

I submit to you and respectfully request that your committee give serious consideration to continuing this all-important program. I thank you, Mr. Chairman, and will be open to any questions that you might have.

[The prepared statement of Mr. McKown follows:]

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BOBBY F. McKOWN
EXECUTIVE VICE PRESIDENT

Statement of

Bobby F. McKown
Executive Vice President and General Manager
Florida Citrus Mutual

Subcommittee on Natural Resources,
Agriculture Research, and Environment

Committee on Science and Technology
U. S. House of Representatives
Room 2325, Rayburn Office Building
Washington, D. C.

February 23, 1982

Good morning, Mr. Chairman and members of the Subcommittee.

My name is Bobby F. McKown. I am Executive Vice President and General Manager of Florida Citrus Mutual, a voluntary cooperative trade association whose membership consists of more than 13,245 active Florida citrus growers, with headquarters at Lakeland, Florida.

Florida's citrus and winter vegetable growers have, do and must continue to depend upon timely information from the fruit frost warning service of the vital U. S. Weather Bureau at Ruskin, Florida. We believe that the Ruskin facility has the latest equipment and state-of-the-art capabilities to more effectively utilize the space age weather technology than any other agency or parts of the private sector. Weather forecasting at its best continues to fall short of the desired mark; however, NOAA provides the most cost efficient agricultural weather forecasting delivery system for Florida growers. In fact, we are just now beginning to adopt the satellite technology into better agricultural frost warning weather forecasting. If the Ruskin facility is scrapped, then these technological advances will be stymied and, in our opinion, would severely handicap our growers' productivity.

The Florida citrus industry consists of predominantly small growers (less than 50 acres on the average) with total acreage of 845,283 located in 32 counties. Small growers cannot afford a private weather service. The $209,000 budget for minimum temperature and frost warning weather system is cost effective, particularly in the area of energy conservation. Low volume irrigation systems are utilized for frost and freeze protection by citrus growers, particularly when temperatures forecast indicate sustained temperatures below 28° - 26°F for six or more hours. Also, growers of specialty citrus fruit utilize grove heaters for fruit protection. Fuel and labor costs to fire a grove range up to $230.00 per acre/per night. Therefore, timely Ruskin weather forecast updates are economically mandatory in order to conserve fuel, prevent unnecessary firing and determination of proper time for commencing the firing operation.

Small growers also use flood irrigation methods for cold protection; again, energy is an important cost in their management decisions. Without the federal frost warning service for citrus, then, our growers cannot take chances. So they fire, flood, irrigate, etc. without efficiencies. Costs rise, consumers and growers, packers and processors are adversely economically impacted, and all adds to the inflationary spiral. The $209,000 budget line item is a good and proper use of growers' federal tax dollars. Our industry is not subsidized, nor do we seek price supports, etc.

Florida Citrus Mutual's staff has met with private sector weather services, which desire to give long-range, weekly forecasts with some direct, limited, short term telephone communications. They do not contemplate service approaching the magnitude or precision of the frost warning service; yet the quoted fees to our assocation for a two months service (January - February) would be $35,000 - $45,000 for this limited inadequate service.

We have conferred with public broadcasting facilities. They are not interested in providing frequent, regularly scheduled weather forecasts or narratives and they are unwilling to read the forecast in its entirety. It is important that the forecast be received without change or editing by our grower members; because the National Weather Service staff develops narratives explaining the basis for the forecast which are unavailable from other sources.

Public and private organizations are not equipped to handle the demand for weather information.

If we could afford it - and we can't - how could we communicate these data from our collective association to our 13,245 members statewide in a timely manner that would be useful? We can't. The National Weather Service via Ruskin has and can communicate these reports via radio, TV, teletype, etc.

Mr. Chairman and members of this subcommittee, Florida Citrus Mutual supports efficiency and good management practices within all agency/governmental channels. However, we respectfully request that the Congress continue to fund the minimum temperature and frost warning forecasts and provide the agency with a priority management directive in order for the agricultural frost warning weather forecast to continue.

Florida Citrus Mutual has already supported a 50 percent reduction of the number of professional personnel at Ruskin from eight to four meteorologists; furthermore, four staff meteorologists would permit continuing the minimum temperature and frost warning forecasts seven days a week, two shifts per day in lieu of full-time 24-hour service. Minimum temperature and frost warning services are important in pre-freeze preparation and vital in post-freeze evaluation of damage to determine juice loss, fruit loss, etc. To eliminate this vital service would deal a severe blow to an industry that is a linchpin of Florida's economy, and set in motion waves crashing against other indirectly affected industries and services.

The Florida citrus industry is a $2½ billion industry; it keeps 90,000 people gainfully employed; it is our state's second largest single industry; and provides stability to our state's economy. For each citrus dollar generated, our multiplier effect is $2.85.

Florida Citrus Mutual does not believe the frost forecast service to be a direct support program for a single industry; it benefits all U. S. citizens. The economic well-being of the agricultural industries of Florida is of direct and major importance to hundreds of thousands of employees not only in the fruit and vegetable industries, but also to those whose livelihood depends upon the serving of these industries.

During 1981 and 1982 the Florida agricultural industry suffered back-to-back devastating freezes and certainly damage would have been far more extensive had we not had the Ruskin Weather Bureau in operation.

In summary, the Ruskin station personnel are of vital importance to protection of the multi-billion dollar investment Florida growers have in more than 845,000 acres of citrus groves, not to mention the major property values invested in Florida's unique tropical fruit and foliage industries. Florida Citrus Mutual recognizes and appreciates the need to economize in government, but we also continue to believe that after additional evaluation, total abolition of the important fruit frost warning service would be adverse to a major segment of Florida's economy. We respectfully request that you support the continuation of the frost warning service.

If you have any questions, I would be happy to respond.

Thank you.

Respectfully submitted,

Bobby F. McKown
Executive Vice President

McK:vb

Mr. SCHEUER. Thank you very much. We will hold the record open at this time for a statement by Congressman Ireland because I know he is deeply interested in this problem.

Congressman Brown?

Mr. BROWN. Gentlemen, what we seem to be faced with this year is really a proposal for a substantial change in Federal-State relationships and in Federal-State-private industry relationships in many ways. I think obviously a strong case can be made for many of these changes.

Dr. Eddy, I am particularly interested in your suggestions as to how the providing of weather and meteorological services might be divided up between Federal, State, and private industry. As I read your statement, your views seem to be concurred in by a substantial number of the people that you have communicated with. Am I right?

Dr. EDDY. Yes, I think that is true.

Mr. BROWN. These are State climatological officers, or the highest meteorological officers in the various States?

Dr. EDDY. Yes. You have replies from a couple dozen here. There are about 43 or 44 in the country. They were all contacted. The rest of them did not reply. However, they are more or less aggressive people. The general idea is that within the States we have normally 10 times the data base for our State that the Federal National Weather Service, NOAA, has for our State. We have special problems and we try to answer State agencies' requests for information and also supply information to the private sector.

Mr. BROWN. Well, do I understand that you have a more comprehensive data base in the State, a State-operated data base, than the Federal Government has? Do I understand that the Federal Government does not get the benefit of the more extended data base that you have; there is not an automatic process by which your data flows into the Federal system?

Dr. EDDY. It is not automatic, and I do not think it is desirable that the National Climate Center would archive all this data but we are all, every one of the State climatologists, working to get a facility or a mechanism to exchange it among the States and with the Federal NOAA groups and the National Climate Center, for example, the climate analysis center, any time they want it. We are working toward that end.

Mr. BROWN. Well, as a scientific problem it probably is fairly complex because in the final analysis you cannot do a good job in forecasting weather at the State level without a lot of national and global data which normally would not be available to you except through a national service.

Dr. EDDY. That is true.

Mr. BROWN. On the other hand, that national data base would be enhanced by exchanging data with the States.

Dr. EDDY. Yes.

Mr. BROWN. Do you think you could make a fairly good dividing line as to how you handle this kind of a complex arrangement?

Dr. EDDY. We can make a fairly good cooperative agreement, and I would like to say one thing, since I saved time in my statement: The National Weather Service, all the components of it—the EDIS, Environmental Data and Information Service—have really been working hard to help us get underway in the States. We have active programs going on, exchanging data—as you suggest, we need data on the larger scale—exchanging it between the States and the Federal Government. To cut that down I think would be not cost effective because we can help out in the States, doing some of the job that the National Weather Service would like to do. We can do it possibly more effectively because we are there and we know the people and we know the problems.

Mr. **Brown**. Well, another interesting question arises: What is the relative level of competence in the various States? What variation is there? In other words, say Oklahoma is the outstanding State in the Nation, you have an excellent network there, but how about Florida? Maybe they do not have any. I do not know. I am just asking you to enlighten me.

Dr. **Eddy**. It ranges from people who have gone through the gamut like I have, from being a forecaster to an academician to a climatologist and a meteorologist, down to people who have gotten into the business maybe as farmers—and they are certainly more familiar than I am with their problems—and other people who have been full-time State climatologists for the last 30 years. I have only been doing it for a few years. There is a wide range in capability. Also there is a wide range in responsibilities. Each State has its own problems.

Mr. **Brown**. Thank you very much.

Mr. **Scheuer**. Now I would like to introduce our colleage, Congressman Andy Ireland from Florida, to make any remarks he wishes to make about your testimony, Mr. McKown, which was excellent and very compelling.

STATEMENT OF HON. ANDY IRELAND, A MEMBER OF CONGRESS FROM THE STATE OF FLORIDA

Mr. **Ireland**. Thank you, Mr. Chairman.

I will say a good word for California, George.

Let me say this, Mr. Chairman: I appreciate and thank you for putting my introduction of Mr. McKown as well as my comments into the record of the hearing. I want to thank Mr. McKown in particular for coming to Washington at this crucial moment to bring his views, the views of the citrus industry, and really the views of other large segments of the Florida agricultural economy to the committee.

At the end of last week I had the opportunity to meet not only with Mr. McKown in Florida but with representatives of forestry, vegetable growing, the whole gamut in the State of Florida. We face a very critical situation here, as you have already heard. We have cut this service to the bone, and in an enlightened approach both by the Florida congressional delegation in representing the problem and by the agricultural industry in Florida, I think the words of Mr. McKown represent those in Florida and I commend them to you. I hope that the committee will give it serious consideration.

[The prepared statement of Mr. Ireland follows:]

STATEMENT OF HON. ANDY IRELAND TO INTRODUCE MR. BOBBY MCKOWN, EXECUTIVE DIRECTOR, FLORIDA CITRUS MUTUAL

Mr. IRELAND. I want to thank Chairman Scheuer for holding these important and timely hearings, and particularly for focusing attention on the need to continue the vital early frost warning service for Florida, California and Texas.

I only want to make a few brief remarks by way of introduction for my good friend and colleague from Lakeland, Fla., Mr. Bobby McKown, Executive Director of Florida Citrus Mutual, our State's principal citrus marketing organization.

Mr. Chairman, as you know, I have been a supporter of the efforts to cut our budget and reduce our deficit over the past year. During that time, I have used as my criteria three questions:

(1) Does the service in question really need to be performed?

(2) Can the private sector provide the service better than government?

(3) Can the private sector provide the service more economically than government?

When it became apparent last year that budgetary reality called for a reduction in the ability of the National Weather Service to continue its traditional early frost warning service for citrus and winter vegetables, I joined with Chairman Fuqua, Senators Chiles and Cranston, and Mr. Chappell, in negotiating a compromise which kept the program going, on a reduced basis, through this winter.

It seemed to me that proposals completely to eliminate the frost warning service could not be justified on any of the three grounds I have cited: the service obviously was critical to our Nation's billion-dollar citrus and winter vegetable industry, and, further, the private sector could not immediately provide either cheaper or better service.

My colleagues and I thus proposed a compromise—a 50 percent reduction in personnel and funding for the Ruskin, Fla. frost warning service, and similar reductions for the other States involved. The Ruskin facility now recieves $120,000 for four personnel.

It seemed to us, and the House agreed in approving the Continuing Resolution in December, that a 50 percent reduction was both fair and reasonable. Further, it seemed to me that given the magnitude of the industry which the frost warning service helps to protect, that $209,000 for Florida and the Nation was a cost-effective bargain by any standard.

I personnally had hoped that this one-year grace period would have enabled the industry to work out an alternative to the Federal program at Ruskin, and the other stations in California and Texas.

But I understand that the vast cooperative nature of the reporting sites, and the technical expertise needed to tailor the weather data for the agricultural industry in a cost-effective way has not been developed as yet.

Consequently, until I am satisfied that answers to my three questions have been achieved, I will support the effort to retain the Ruskin program, and the programs in California and Texas, at their present levels of funding.

In conclusion, Mr. Chairman, and I thank you for this opportunity to introduce Mr. McKown, I think we have been very well served by an expenditure of less than $500,000 annually for the entire Nation, and that it would be penny-wise and pound foolish to eliminate the early frost warning service in fiscal year 1983—unless or until we can work out a cost-effective alternative.

I will have a more detailed statement for the record of your hearings on March 3. Again, thank you Chairman Scheuer. I'd like now to introduce my good friend and colleague from Florida Citrus Mutual, its Executive Director, Mr. Bobby McKown.

Mr. SCHEUER. Well, we will give it extremely serious consideration. We were impressed with what Mr. McKown had to say. We were impressed with all of the witnesses. We thank you very much for your efforts today.

[Whereupon, at 12:44 p.m., the subcommittee recessed, to reconvene at the call of the Chair.]

FISCAL YEAR 1983 NOAA AUTHORIZATION

THURSDAY, FEBRUARY 25, 1982

House of Representatives,
Committee on Science and Technology,
Subcommittee on Natural Resources, Agriculture
Research, and Environment,
Washington, D.C.

The subcommittee met, pursuant to notice, at 2 p.m., in room 2325, Rayburn House Office Building, Hon. James H. Scheuer (chairman of the subcommittee) presiding.

Present: Representatives Scheuer, Carney, Sensenbrenner, and Schneider.

Staff present: Bob Palmer, science consultant; Maryanne Bach, technical consultant; and Kim Moses, staff assistant.

Mr. Scheuer. The Natural Resources, Agricultural Research, and Environment Subcommittee will come to order.

Today, we are continuing our authorization hearings on the environmental research budget of NOAA and the EPA. And the subject of today's hearings will be the impact of the fiscal year's budget, for 1983, for both NOAA and EPA on research and development programs concerned with the ocean's resources and the impact of pollution on ocean resources.

We are going to have a distinguished group of scientists, State officials, and representatives of environment groups who will give us their views on two issues. First, the need for ocean pollution research and, second, the respective roles of the Federal Government, the States, and private industry in organizing, planning, and supporting this research. Next week we will be hearing from both the Administrators of NOAA and EPA on their plans for ocean pollution programs.

This is clearly a time when interest in ocean pollution is increasing. The coming decade will see increasing pressure on coastal waters and the oceans from increasing oil exploration, and from development of coal exports, which apparently isn't but should be a national priority. In the case of the city that I represent, New York City, and other metropolitan areas, there is growing resistance of their citizens to disposal of domestic wastes and industrial wastes on land, near to or in their communities. We had a case just in the last 6 months or so where the city of New York actually took EPA into a Federal court, claiming that EPA's prohibition of ocean dumping in the New York City Bight was illegal. The court sustained them and said that unless EPA could make a showing that ocean dumping was unreasonable as compared to other methods of dumping, that New York City should be permitted to continue dumping in the New York City Bight. And I guess we can expect more of that.

The whole question of the impact of disposal of wastes is the ocean and in coastal waters is going to have an increasingly important impact. We are all concerned about the ocean pollution activities of both EPA and NOAA.

Now, it is of some concern to me, and a matter of regret—and I say this more in sorrow than in anger—that no representatives, either of the chemical industry or the petroleum industry were willing to come and testify here. We have been in touch with representative groups from both of these industries for over a month, but we were unable to get any of them to testify. Now, it may be they felt that they had nothing to contribute to our proceedings here today. I hope they didn't feel that way, and it seems to me they ought to think long and hard before denying that expertise to this committee and other committees of the Congress. They do not hesitate to make their feelings known in very unmistakable terms when they feel we have legislated environmental controls and environmental standards that are expensive for them, that they claim are not cost effective, and they may very well be right. This committee is absolutely determined not to legislate standards or control systems that don't make sense, and where the benefits are not clearly in excess of the cost. We want to do right by the American public and that includes the business community. It seems to me that they best serve their own interests, as well as the interests of society, when they come in and give us their best judgment as to the for instances of our controls and various controls and regulations program. We want their input. We want their advice. I don't think they can play it both ways and adopt the posture that they are not going to help us, they are not going to be involved, they are just going to stand on the sidelines and carp and complain. I don't think that is a proper role for them, or a viable role, and I hope very much that they will not adopt that role.

Before we turn to the witnesses, let's hear from our distinguished ranking minority member, Congressman Carney of my State of New York.

[Opening statement of Mr. Carney follows:]

OPENING STATEMENT
FOR
HON. WILLIAM CARNEY
FEBRUARY 25, 1982

THANK YOU, MR. CHAIRMAN. TODAY, IN OUR HEARINGS, WE ADDRESS A COMPLICATED AND VERY INVOLVED TOPIC, THAT OF OUR NATIONAL POLICY AND RESEARCH DIRECTIONS IN THE AREA OF OCEAN DUMPING AND OCEAN POLLUTION.

I AM ENCOURAGED AND IMPRESSED BY THE QUALIFIED AND DISTINGUISHED WITNESSES TESTIFYING BEFORE THIS SUBCOMMITTEE AND APPRECIATE THE CONTRIBUTIONS THEY BRING WITH THEM TODAY.

THE NEED FOR HIGH QUALITY OCEAN POLLUTION DATA AND INFORMAITON IS EVIDENCED BY RECENT 1981 NATIONAL ADVISORY COMMITTEE ON OCEANS AND ATMOSPHERE'S (NACOA) RECOMMENDATION THAT THE OCEAN MIGHT BE USED FOR DISPOSAL OF SEWAGE SLUDGE AND SOME INDUSTRIAL WASTE, THE FEDERAL COURT DECISION IN MANHATTAN, AND ALSO BY RESEARCH IN SUPPORT OF THE ASSIMULATIVE CAPACITY OF THE OCEAN FOR DISPOSAL.

THIS YEAR, OUR SUBCOMMITTEE WILL AUTHORIZE THE NOAA FY1983 R&D BUDGET, THE EPA FY1983 R&DBUDGET. OUR FULL COMMITTEE, THE COMMITTEE ON SCIENCE AND TECHNOLOGY WITH THE COMMITTEE ON MERCHANT MARINE AND FISHERIES WILL BE REAUTHORIZING THE NATIONAL OCEAN POLLUTION PLANNING ACT AND TITLE II OF THE MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT (OCEAN DUMPING ACT). IT, THEREFORE, IS CRUCIAL THAT WE TAKE A CROSS-AGENCY LOOK AT THE RESEARCH AND PROJECTED NEED FOR RESEARCH TO ADDRESS THE QUESTIONS WE WILL BE DEALING WITH THIS YEAR KEEPING IN MIND THE MANDATE OF THE ADMINISTRATION TO CUT BACK ON FEDERAL SPENDING.

THE DECISIONS THAT FACE US ARE TOUGH ONES, ONES THAT WILL EFFECT STATE, FEDERAL, AND INTERNATIONAL WATERS AS WELL AS THE ENVIRONMENTAL QUALITY, HEALTH AND SAFETY OF OUR NATION. LET US PROCEED WITH THOSE PRIORITIES IN MIND.

Mr. CARNEY. Thank you, Mr. Chairman.

Today, in our hearings, we address a complicated and very involved topic, that of our national policy and research directions in the area of ocean dumping and ocean pollution.

I am encouraged and impressed by the qualified and distinguished witnesses testifying before this subcommittee and appreciate the contributions they bring with them today.

The need for high quality ocean pollution data and information is evidenced by recent 1981 National Advisory Committee on Oceans and Atmosphere's [NACOA] recommendation that the ocean might be used for disposal of sewage sludge and some industrial waste, the Federal court decision in Manhattan, and also by research and support of the assimulative capacity of the ocean for this disposal.

This year our subcommittee will authorize the NOAA fiscal 1983 R. & D. budget, and the EPA fiscal 1983 budget. Our full committee, the Committee on Science and Technology, with the Committee on Merchant Marine and Fisheries, will be reauthorizing the Natonal Ocean Pollution Planning Act and title II of the Marine Protection, Research and Sanctuaries Act, the Ocean Dumping Act. Therefore, it is crucial that we take a cross-agency look at the research and projected need to address the questions we will be dealing with this year, keeping in mind the mandate of the administration to cut back on Federal spending.

The decisions that face us are tough ones, ones that will affect State, Federal, and international waters as well as the environmental quality, health, and safety of our Nation. Let us proceed with those priorities in mind.

Mr. Chairman, I appreciate your giving me time for an opening statement, and I yield back the balance of my time.

Mr. SCHEUER. Thank you, Congressman.

Now we will hear from our newest colleague, Claudine Schneider.

Mrs. SCHNEIDER. Mr. Chairman, I am so anxious to hear the testimony of the expert witnesses that I am going to pass on a statement this afternoon.

Thank you.

I have the distinct pleasure, as the chairman informs me, of introducing a friend and scientist of world reknown, who will be the first panelist to testify, Dr. Ed Goldberg from Scripps Institute of Oceanography, from La Jolla, Calif. I will say that certainly his reputation as a scientist and as one who is knowledgeable in the area of ocean pollution and ocean dumping is quite international, I have had the pleasure traveling with this gentleman. I should really clarify that [laughter] to the Soviet Union, in an effort to make bilateral agreements with the United States and the Soviet Union to arrange for an international oceanographic treaty. His legacy is known far and wide as well as his expertise in ocean monitoring and ocean concerns. Dr. Goldberg, would you please come forward and tell us everything we need to know.

Dr. GOLDBERG. All right.

Could we bring up the other members of the panel, also, Dr. George Woodwell of the marine biological laboratory at Woods Hole, Mass.; Mr. Willard Bascom, Southern California coastal water research project; and Mr. Kenneth Kamlet, National Wildlife Federation.

Mr. SCHEUER. Dr. Goldberg, we are happy to see you. This committee is going to be visiting the Scripps Institution on our Easter recess and we hope that we will have a chance to chat with you again.

Before you start, let me say to all the members of the panel we are delighted to have you here today. All of your testimony, will be printed in the record. So we hope each of you will sum up the highlights in 5, 6, or 7 minutes, and then I am sure we will all have questions for you.

Dr. Goldberg, with that splendid introduction, which really didn't qualify the parts that shouldn't have remained qualified, and I am sure will add luster to the reputation of this committee, please take such time as you may need.

STATEMENT OF DR. EDWARD GOLDBERG, SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.

Dr. GOLDBERG. Mr. Chairman, members of the committee, and especially Congresswoman Schneider, I most pleased to be here to give my views upon the use of the oceans as potential waste space for the discards of man.

I have been involved for the past 30 years in marine pollution research and marine pollution activities, and today I see this as a springboard, as a stepping stone, to give an understanding of the extent to which one can use the coastal ocean resource for some of the wastes of man. Now, I would like to stress the following: There is an active marine scientific community that has an interest and a dedication to the assessment of coastal waters for waste such that renewable resources are not lost.

Now this concept that we can put toxic and nontoxic materials in the ocean arose about 25 or 30 years ago when scientists in the United States, Russia, and the United Kingdom recognized that the health of man and the living resources of the Sun could be jeopardized by the promiscuous release of radio activity to the oceans from the development of nuclear energy. And they asked a question, "How much of this material can you put into the oceans and still protect the most exposed individual, through the consumption of seafood or through exposure on beaches where radioactivity might end up?" As a consequence of work over these years, I argue, we have kept the oceans free of unacceptable amounts of radioactivity that might jeopardize the health of man or other living organisms.

Now, in these 25 years this same scientific community, has identified other materials that could endanger the resources of the sea—sometimes by catastrophe, sometimes by rational thinking. By "catastrophe," the mercury releases in Minimata Bay. By rational thinking, the DDT releases to the environment, an effect which my colleague George Woodwell was deeply involved in, and as a consequence of his work and of others we have effectively introduced a very sophisticated concept into the use of the oceans as waste space: We do not jeopardize the integrity of ecosystems.

Now we are faced with a most important problem: To what extent can we use the oceans as waste space. Past pollution research is a springboard to make these considerations. There are some differences which are going to require additional research. What are the differences?

In pollution research we identified single substances, or groups of substances, which could impact upon organisms or man and we have identified causal relationships between the substance and the impact. Now, today we have large numbers of substances, some of which can be hazardous, and some of which are benign, which can be introduced into the oceans. Today we have the general problem of identifying stress from a large number of unidentified substances. We don't have the money to really analyze effectively the composition of the materials we are introducing to the oceans. So, the No. 1 key to the effective use of the oceans as waste space is to develop field methods of determining stresses upon ecosystems.

There is another difference from our previous work in pollution where we were concerned primarily with protecting human health. In the utilization of the oceans as waste space domestic and industrial discard, the concern is going to be with the protection of ecosystems. Can we develop field techniques that will describe an effect which may be unacceptable if the amounts of waste that we put in are too large. This is an area that I submit is going to require the attention of the best marine scientists that we have.

Finally I foresee a need for an intensive effort to gain an inventory of the waste generation for the present and in the future. In our pollution work we were generally aware of the source terms, that is the amounts of materials that were being introduced per unit—radioactivity, hydrocarbons, or DDT. In the case of the waste materials we are as yet to develop an annual inventory of the amounts of each type generated and the location of generation.

I submit we have a community of scientists who can attack these problems successfully.

Why do I emphasize the oceans as a waste receptacle? I argue on two bases the ocean should be assessed in detail. First of all, I submit that we marine scientists know much more about fates and behaviors of materials that we introduce into the oceans than do our landlocked colleagues about the fates of materials that we put on land. We know much more about the plumbing of the sea than we do about the plumbing of terrestrial waters which can be endangered by the indiscriminate placing of wastes on land.

I want to emphasize that the land resource that we are concerned about are our subterranean waters. Of our population, 40 percent drink water from underground sources. It is this resource that I wish to protect. But I also wish to protect the terrestrial ecosystems. I again submit that the marine scientific community has made as extensive, if not more extensive, investigations of the impact of various pollutant materials upon the marine life, than have their terrestrial counterparts.

So in conclusion, we have a competent scientific community to assess the oceans as waste space. I argue that some additional research is needed on the impact of a large number of polluting substances upon ecosystems. Different cause-effect relationships and different measurements of stress upon marine communities that must be sought. Our effective management of known pollutants to the oceans does provide a base for the effective management of wastes which can be put into the marine environment.

I thank you.

[The prepared statement of Dr. Goldberg follows:]

TESTIMONY OF EDWARD D. GOLDBERG BEFORE THE COMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY

February 25, 1982

I am Edward D. Goldberg, Professor of Chemistry at the Scripps Institution of Oceanography, University of California at San Diego, La Jolla, California. For the last quarter century I have been involved in marine pollution problems both in my researches and in my teaching. I have written one book, The Health of the Oceans, for UNESCO and have conducted workshops for FAO, NOAA, EPA, UNESCO, NRC and DOE on the subject. I have published about fifty research articles on various aspects of society's alteration of the oceans.

The scientific researches on marine pollution conducted over the past three decades have provided a most substantial information base on which to assess the role of the oceans as a receptacle for a part of the cubic kilometer of waste materials (excluding those from fossil fuels) each year generated by world society. However, the difficulties associated with an evaluation of the assimilative capacity of a given marine area for specific wastes can be most difficult and demonstrate the need for additional researches. It is to this problem that I wish to address my remarks.

Up until the middle of the twentieth century most discards to the oceans were natural products, introduced in small amounts, which did not alter the nature of the marine environment in a significant way. However, in the early 1950s some environmental scientists recognized that the uncontrolled release of artificial radionuclides from energy installations to the marine environment could jeopardize public health. Scientists from many countries were involved in ascertaining the abilities of ocean water to accept artificial radionuclides such that there would be a minimal risk to humans through exposure or through the consumptions of seafood.

Investigations in the United States, primarily at academic institutions, were sponsored by the AEC (later ERDA and now DOE) and provided a scientific base upon which to regulate the ocean disposal of artificially produced radioactive substances. The involved scientists and the agency representatives were in constant communications through workshops and direct contacts such that significant and relevant studies to the mission of the agency were identified and carried out. This collaboration is still maintained. As a consequence, there is an effective and rational management of low level radioactivity discharges to the marine environment.

During the past thirty years, other pollutants entering the oceans have been identified and controls have been established upon their environmental dispersals such as DDT, mercury, PCBs, among others. Although the initial studies in marine pollution had as a goal the protection of the human health, the present investigations include a concern with the protection of life in the oceans such that the integrity of ecosystems is maintained. Recognition of pollutants sometimes can abut through catastrophes such as the Minimata Bay epidemic of neurological disease from methyl mercury in Japan or the Kepone episode in Virginia.

There are two important commonalities in these studies of marine pollution. First of all there is a clearcut cause/effect relationship between the pollutant and its impact. In the case of radioactivity, the individual species, such as strontium-90 or plutonium, have known paths through the human body and their impacts upon specific organs are recognized. Methyl mercury ingestion causes well-known symptoms of neurotoxicological poisoning such as loss of motor ability, blindness, and ataxia. The population decrease of some bird populations could be related to the effect of DDT upon calcium metabolism with a resultant thinning of eggshells. The eggs were easily damaged and poor reproductive successes resulted. In summary, the individual pollutants were identified and their impacts upon living organisms were recognized.

Secondly, the fluxes of the pollutants, whether they came from a unique source like a nuclear reactor coolant system or from a widespread set of sources such as the agricultural biocide DDT, were known. Account sheets of their amounts and persistences in the environment could be formulated. Measured environmental levels could be compared with computed environmental levels. These in turn could be compared with environmental levels that were calculated to provide minimal risk to living organisms.

But problems have arisen that are yet to be resolved or perhaps designated as non-problems. The highly sophisticated instruments available to assay environmental levels of potentially toxic substances such as chlorinated hydrocarbons reveal a large number of unidentified signals at levels that might impact upon living organisms. These peaks have not as yet been associated with a specific substance as such work is time consuming and expensive. Some peaks may relate to naturally occurring compounds, others to pollutants. But some of the more distinguished marine environmental scientists wish to maintain communications between laboratories about these peaks to ascertain if they are increasing with time and if they are ubiquitous in the environment. They have sought a computer information system to handle this problem. Their requests have fallen upon deaf ears in the agency which should be most interested in the work (NOAA). Other scientists have raised concerns about some environmental pollutants which may be causing damage at present but which are not being investigated adequately. One such collective of compounds is the biocide toxaphene. Although EPA is aware of the scientists' concerns, and of the desire of these scientists to be involved in researches, funding is yet to be made. There is a much poorer collaboration between EPA and NOAA and academic scientists than there is between the nuclear agencies and their colleagues who investigate environmental radioactivities.

Many marine pollution scientists are now addressing their researches to the possible use of the oceans for some wastes, even though such discharges are prohibited by law. Each year world society generates about two and one half billion tons of waste, a volume of about a cubic kilometer. These materials must be placed somewhere -- either in the atmosphere, on land, or in the marine environment. For readily burnable materials, the atmosphere may be most attractive. Land disposal appears most rational for high level radioactive wastes. Why consider the oceans? Clearly, in some areas of the United States, adjacent to large population centers, we are running out of land areas such as in the Pacific Northwest and in New York. Two years ago, a NOAA workshop composed of 70 marine scientists indicated that the U.S. coastal ocean is apparently underused with respect to the accommodation of some wastes.

Moreover, there is one most compelling reason to contemplate the oceans for some of societal discards -- we are jeopardizing through land waste disposal the quality of our ground waters which provide drinking water for about 40% of our population. Organic contaminants in sewage waters are finding their way into underground systems. Sewage sludges contain contaminants that can work their way into ground waters if applied to land. Coupled with the illegal dumping of toxic wastes, these practices have lowered the quality of our ground waters significantly. Although the extent of contamination is unknown, reports about polluted waters are increasing.

Thus, for any given coastal area, it is essential to consider both the oceans and lands as potential disposal sites and to choose between them on the bases of scientific, technological, economic and social grounds.

Unlike the situation with the intensively studied pollutants, the fluxes of domestic and industrial wastes to the environment are poorly known. Crucial for the evaluation of potential disposal sites is a national inventory of waste production in which data on amounts, nature and sites of generation are collated. Although bits and pieces of this information are routinely gathered by various government agencies, a coherent and comprehensive annual report is yet to be made. This information is necessary for models of the carrying capacities of potential disposal sites, whether land or sea, to determine whether or not there is any predictable danger to renewable resources.

Although detailed information is desirable, it is well-recognized that some of the information is unattainable or perhaps difficult to obtain. The compositions of most wastes are poorly known and their analyses would be extraordinarily costly for all potential toxins. Further, industries are hesitant to release information on wastes -- amounts and compositions -- since it might jeopardize their economic status through release of manufacturing strategies to their competitors. Still, it may be possible to obtain from industries laundered data that will not harm their economic positions.

In contrast with previous studies on pollutants, we are now concerned with the entry of unknown and complex mixtures to the oceans. Can we protect life in the sea under such constraints? Many of my colleagues say "yes" and are actively seeking field measurements which will indicate when organisms in a given marine zone are overstressed as a consequence of pollutant entry. This is a formidable task.

There are a few innovative and daring investigators seeking solutions to this general problem. The most extensive efforts are in the United Kingdom. For example, the ability of small sea creatures to convert food into protoplasm is indicative of the viability of seawaters -- the so-called "scope for growth" concept. In England, the ability of a single species to grow varies over a factor of ten in different areas of the coast. Clearly, the translation of such a concept into public policy may be difficult. Is a loss of an ability to grow by ten percent acceptable in a polluted area? In nearly all cases of environmental management there are judgments to be made both by the scientist and by the public official. This situation should not prohibit attempts to understand the impacts of pollutants and to regulate their inputs.

The evaluation of the oceans as waste space in comparison to land options will be made more effectively in the future if the scientists, both in the academe, government and the private sector are allowed and encouraged to continue their researches initiated over thirty years ago in marine pollution. Hopefully, the present reorganizations in NOAA and EPA will bring forth scientific administrators and policy to encourage such research. The example of the collaboration over the past quarter century between agencies responsible for nuclear activities and academic scientists provides a springboard for future activities.

Mr. **Scheuer**. Thank you very much, Dr. Goldberg.

And now we will hear from Dr. Woodwell.

STATEMENT OF DR. GEORGE M. WOODWELL, MARINE BIOLOGICAL LABORATORY, WOODS HOLE, MASS.

Dr. **Woodwell**. I am G. M. Woodwell from the Marine Biological Laboratory. I am an ecologist. I have worked on these problems for many years. Dr. Goldberg's statement is a splendid one; I think it is entirely appropriate for the moment; I think it is inadequate for the future. We are living in a time when all resources, as the chairman pointed out a few minutes ago, will come under intensified use. The process of intensification must be based on an increasingly detailed knowledge of environment and a higher degree of management of resources. It is based also, if it is successful, on an increasing degree of regulation of human behavior. We can't have growth in numbers of people, growth in technology, and growth in the total human enterprise without a parallel development in capacity for managing resources.

We seek systems or management of resources that will allow the growth that appears inevitable over the next years. The question is whether the present system of management of wastes that is based fundamentally on dilution can sustain intensified use of the coastal oceans. We have a large body of experience and data from ecology, from marine biology, oceanography, the very data and experience that Dr. Goldberg has mentioned, that indicate that the present system is inadequate. Unmodified it will lead to a series of transitions that ecologists tend to think of as biotic impoverishment, including ultimately the irreversible contamination of human food chains with toxic substances. In the present system as interpreted by Dr. Goldberg the role of the scientific community is scarcely more than codifying the system for performing the dilutions.

Dr. Goldberg, we mentioned assimilative capacity and suggests that the coastal waters have an unused assimilative capacity for various wastes. Yet in many instances where assimilative capacities of the coastal waters are examined in a general context we discover that we are now at or above the level set by a reasonable appraisal of what the assimilative capacity might be for any one of several toxins. I have discussed this point in my written testimony.

Dilution continues to work where there is a sufficient volume to disperse the wastes. It works for instance on the coast of California where the continental shelf is narrow and currents are high. But dilution fails progressively with time and with increased volumes of waste. It fails partly because the composition of the wastes cannot be controlled. There are physical, chemical, and biotic mechanisms that result in the concentration of certain toxic substances such as some of the chlorinated hydrocarbons in surprising places. The concentrations in living systems exceed a factor of 100,000-fold above those in the water. There isn't an assimilative capacity that is measurable for such substances and there is no way of managing their release that will protect biotic resources and people. DDT is a good example. When the problems of managing it were examined in detail, the only effective practical solution was to ban it, for all practical purposes, in the United States. The assimilative capacity of coastal waters for such substances is zero.

Further, the release of substances that are not normally individually considered as toxins, substances such as nitrogen and phosphorus, causes the series of changes called eutrophication. If the release continues eutrophication becomes pollution. The transition is conspicuous in various segments of the coastal zone at the moment. Growth in the human enterprise overwhelms the capacity for dilution. That seems obvious.

Finally, a commitment to a system of managing wastes based on dilution is substantially irreversible. We cannot correct the problems of waste management in New York City at the moment. We can, however, avoid the development of such problems in other cities. The program of activities that Dr. Goldberg has described is for the moment appropriate; it is, however, inadequate for the future. The inadequacy requires some new approaches.

We cannot afford to have both growth and a pattern of management of wastes based on dilution. The new approaches obviously involve reduction in the sources of wastes. There are various methods. The most general and in many ways the most promising approach would be a new technical and scientific program aimed at closing man-dominated systems. There are ways of limiting the amount of water that is released as waste from cities. If the waste water released from houses, for instance, were reduced to one-tenth the current release, a step that is quite possible, there would be a drastic reduction in the cost of building cities, as the needs for central water supplies and central sewage treatment plants were reduced.

It is appropriate and necessary to look now toward a transition in the management of wastes. We cannot afford more time or more investment in systems that cannot sustain the intensified use of the coastal zone that continued growth will bring. It is appropriate for the Federal Government, to develop now a new facet of science and technology concerned with the closure of man-dominated systems. The effort might well be centered in the agencies whose budgets you are concerned with at the moment, and perceived jointly with industry and with the States. But there is an absolute necessity that the Federal Government participate, by offering intellectual, emotional, and financial encouragement.

Let me make one final point about information. All of this progress hinges on information of various sorts—new information which comes through research. We tend to hear the scientific community bickering among themselves about information and how it should be applied in public affairs. Some will probably interpret remarks of this committee as bickering. We are arguing, however, usually in science about a very small amount of the total amount of knowledge available, and that argument is the basis on which new knowledge is produced. So we can't judge all of science on the basis of the fact of argument at the moment; the fact of argument is a part of the production of new knowledge, which is science.

At the moment, with the growth in the human enterprise, it is absolutely necessary that we continue the development of the scientific enterprise and the production of new knowledge. That development is threatened at the moment by the cuts in the EPA budget which hit especially powerfully at the research and development arm of the EPA. I find that totally unacceptable. Working directly contrary to the need I have outlined above.

There is, moreover, a need for redundancy in research. There isn't any question but that new knowledge must be tested. It is tested by developing that knowledge from several different directions, arguing the points that scientists argue regularly. So while it may be administratively attractive to have one single program addressing one single question, it may not serve the development of new knowledge well. That knowledge will be developed best by having several programs that converge on the question. For that reason it is essential that we preserve the research capacities of the EPA as well as the National Science Foundation, the Department of Energy, NOAA, and other governmental agencies that address such topics. There is no escaping the importance of the role of the Federal Government in offering leadership on these subjects.

Thank you.

[The prepared statement of Dr. Woodwell follows:]

Testimony of G. M. Woodwell
before the Subcommittee on Natural Resources,
Agriculture Research and Environment of
the House Committee on
Science and Technology
February 25, 1982

I. Introduction:

I am Director of The Ecosystems Center of the Marine Biological Laboratory in Woods Hole, Massachusetts. I have been doing research in and teaching ecology for more than 25 years. Before taking my present position in 1975, I was Senior Ecologist at Brookhaven National Laboratory. I have held a Lectureship at Yale for many years and teach occasionally at other universities. I am a former president of the Ecological Society of America and maintain a continuing interest in the development and application of science in public affairs.

I am delighted that you are holding this series of hearings and am pleased to have been asked to testify. I shall restrict my comments to problems of pollution and to a general statement about the E.P.A. budget.

II. General Observations:

I wish to make three general points about the series of problems the Subcommittee is addressing in these hearings. The points are drawn from a longer statement that appears here as Appendix A.

1. Our present system of managing pollutants in the coastal oceans on the basis of assimilative capacity is failing to protect both human health and renewable resources.
2. There is a need for a new approach to management of pollution based, not on the apparently simple choice of whether to dispose of wastes into the air, onto the land, or into the oceans, but on how to reduce the volume of wastes produced at the sources. The transition toward reduced waste production will require continued federal pressure toward the closure of man-dominated systems.
3. The transition will require imaginative new approaches in science and engineering, with a diversity of federal programs that invite innovation in the public and private sectors and offer financial incentives.

III. Specific Observations:

1. The Need for Information.

The questions you raise as the charge for the Subcommittee in this set of hearings can all be addressed in the context of the need for much more effective steps in management of wastes. I choose to address topics that I consider most important first. These have to do with the need for information, about the wastes themselves, their circulation in nature, and their effects; and about how to reduce the volume of wastes produced.

The information is derived from research. A human enterprise that is expanding into a finite earth requires intensified management to avoid conflicts. The basis for intensified management is information. That information comes from industry and from research including field observation, monitoring programs, laboratory and field experiments. There is no alternative to federal leadership. Responsibility can be placed only in part on industry and on the states.

2. The Need for Redundancy in Research:

While it may seem wasteful to support two or more programs of research that have similar objectives, knowledge is advanced by testing it in various ways, by argument and by new observation and experiment. The arguments and the duplication are a part of the process of verification, part of the development of new information. The process depends on a diversity of approaches; the process and its product decay and become false when not challenged. Effective challenges require competing sources of information. An aesthetically pleasing concentration of research in one agency of government is neither desirable nor safe. This means that we must not simply preserve but vigorously encourage the separate research efforts of the EPA, NOAA, the NSF, and the Department of Energy, all of which have significant programs treating different aspects of the pollution problem. While the proposal to dismantle the Department of Energy and to transfer much of the DOE research to the Department of Commerce would bring an apparent economy through consolidation, it would also bring reductions in the diversity of approaches, in the potential for challenge, and in the production of new knowledge. While each existing program can be criticized, the sum of these is now inadequate; reducing them further will not improve our overall capacity to address the problems of pollution over the next years, when most indications are that the problems will be more severe.

3. The Need for Use of the Academic Community through Grants.

The overall academic enterprise has made and continues to make substantial contributions to analyses, interpretations, and potential solutions of the various problems of pollution. The granting programs of governmental agencies are a major means of stimulating the innovation and testing that is so essential to the flow of information. Economies in government are now stifling these programs at the very moment when the information from them is needed most.

4. The Federal Role:

The problems of oceanic pollution are no longer local issues. The national and international dimensions are, in large part, beyond the capacity of the states and of industry, without strong leadership from the federal government. The leadership requires clearly ennunciated objectives as well as financial support.

5. Budget Proposals

(a) The OTA should be asked immediately to prepare a proposal for the development of a National Research

Program on the reduction of wastes. The first steps in such a program might be development of ways of closing or restricting losses of water from dwellings. They might continue with systems for restricting uses of energy and for recirculating such essential elements as nitrogen, phosphorus and sulphur normally dumped by municipal sewage treatment. The studies must extend as well to the closure of industrial processes. In this effort the industries themselves can be expected to provide initiative, even leadership. Details of the program, however, including its feasibility, should be sought from OTA.

(b) Proposals to limit the flow of information through restricting existing research should be scrutinized carefully and in most instances reversed. The general reductions in the EPA's budget for research and enforcement proposed by the Administration stand to cripple the government's ability to do its job, both as called for by common sense and as legislated by the Congress.

APPENDIX A

WASTE DISPOSAL: TIME FOR A NEW APPROACH*

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The nation has a serious problem with the disposal of wastes. The practical man observes that they must go on the land, into the air, or into the sea. The proposition at the moment is that the sea can and should take more. Carefully reasoned arguments are advanced to prove that the oceans have an assimilative capacity for wastes and that where that capacity is not now used, it should be. The arguments come in several forms and have become more shrill in recent years as the deadlines for meeting requirements of legislation of the early 1970's approached (NACOA 1981; U.S. Dept. of Commerce 1979; Oceanus 1981). The system for managing wastes remains fundamentally unchanged in all but the details of apology since Roman times or earlier. It is failing.

The issue is awkward, objectives are confused, within government, within the community of scientists who deal with the problem, and among various other segments of the public. The problem is in part a challenge in the management of a commons as set out by Garrett Hardin so lucidly in 1968 and discussed in this context recently by Kamlet (1981). There is profit in focussing benefits narrowly and selfishly and spreading costs broadly and generously. But there is also a problem in recognizing what is important. Apologists for the current system tend to emphasize current economic issues, the protection of human health, and other biotic effects in that order. The economic issues are always clear, immediate and well represented. The human health aspects are less clear, but the arguments are both compelling and often compromised. Other biotic effects seem remote in place and time and are dismissed as unproved and therefore trifling. Yet, the hazards to the biota are the most important. If they are recognized and accommodated, human health will be protected as well; so will the common interests in renewable resources. And so will the longer term interests of the industrial system.

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* Adapted from remarks at the American Geophysical Union joint meetings with the American Society for Limnology and Oceanography, San Antonio, Texas, Feb. 17, 1982.

There is one fundamental difference in perspective here. The difference is between those who see the interests of man inevitably tied to his economic system and all else as secondary, and those who see human welfare as inevitably dependent on the biotic systems of the earth and set this topic forth as more important than immediate economic or political objectives.

The present system seems reasonable, but it does not work. It is based on the age-old assumption, only recently codified, that the environment has an assimilative capacity for wastes. The concept is that the combined processes of dilution, chemical and biotic degradation, and sedimentation render wastes innocuous. Natural systems can be exploited systematically to treat wastes. The model, if applied and used rigorously, requires recognition of a series of thresholds for effects. The thresholds are necessarily arbitrary. But the range of toxins accommodated appears infinite: there is, after all, room in the world for some quantity, albeit small, of everything, is there not? The reasonable man would seem forced to argue so; and scientists are reasonable men. Toxicity is simply a matter of concentration and we would be capricious, arbitrary, and unreasonable to argue otherwise. The problem lies in regulating the concentration; not more. The system is based on the age-old principle of dilution, surely a simple, effective and reasonable approach, well established in history (U.S. Dept. of Commerce 1979, p. 154, # 2.2.3).

The most comprehensive review of the system has been supplied through a summer workshop at Crystal Mountain, Washington in 1979, the proceedings of which were edited by E. Goldberg (U.S. Dept. of Commerce 1979). Three major studies for which significant data exist to appraise biotic hazards were examined in detail: The Southern California Bight, Puget Sound, and the New York Bight. The results were striking. Dr. Goldberg has chosen to interpret them as showing that there is unused assimilative capacity in the coastal waters. I disagree on the basis of the same experience.

In the New York Bight this analysis estimates the hazards from microbial agents, from PCB's, from cadmium and from nitrogen. In each instance there is substantial question as to what an appropriate criterion of the limit of assimilative capacity might be. For PCB's for instance the development of a model using data available on transport of PCB's into the Bight suggested that residues in fish should be in the range of 0.1 - 0.25 ppm. If the maximum acceptable level for food is 0.5 ppm as established by the EPA (1976), then there is the possibility that the assimilative capacity has not been exceeded according to the model.

However, data from fish in the area (Pearce 1979) showed concentrations of PCB's between 0.6 and 1.8 ppm in striped bass and 0.1 - 0.4 ppm in winter flounder from Raritan Bay. The authors describe these data as "within the range" calculated by the model. I observe that they are both beyond the range of the model and one set of data is beyond the EPA limit for food. The cadmium story is similar: clams and oysters contain levels of cadmium in excess of the 0.5 ppm limit established for human safety.

The most important factor affecting such data is the simple fact that such substances as PCB's, DDT, other chlorinated compounds such as toxaphene, Kepone, Mirex, aromatic hydrocarbons and metals may be concentrated in living systems to as much as 10^5 times the concentrations in water. Differences among organisms of a factor of ten are common; differences of several orders of magnitude among groups of organisms are equally common. What is a reliable prediction of a threshold for effects? How can such substances be managed effectively when contained in mixed wastes from industry, in municipal wastes, in water draining from the land, and when delivered through the air as well?

The Crystal Mountain study offers a further analysis of the PCB problem.

> "Finally, we caution that the assimilative capacity calculations given here are valid only for our stated purpose, i.e., restricting PCB content to a maximum of 0.5 ppm in edible finfish. Other animals of the Bight apex ecosystem, as as bivalves and raptorial birds, would require a much lower level of PCB to be fully protected. We also are aware that any body burden of PCB may be deleterious to the finfish of the Bight."

In each of the sections of this study some such caveat was seen as appropriate. There was an additional, more general caveat in the section on the N.Y. Bight to the effect that:

> "The strategies discussed in this chapter for determining the assimilative capacities of individual contaminants assume that the other contaminants present will not intereact cumulatively to increase the biotic effects of the contaminants being evaluated. There is abundant laboratory and field evidence that combinations of contaminants do have cumulative effects and that reductionist approaches almost always underestimate ecological and public health effects (Woodwell, 1974). Furthermore, it is clear from the analyses in this report and others (e.g., O'Connor and Stanford, 1979) that individual contaminants in the

> environment seldom appear to be concentrated enough to degrade the inner Bight ecosystem or to unduly toxify marine foods. Yet this ecosystem is severely degraded in several respects and modified in others, in response to cumulative effects of these same anthropogenic loadings (MESA, 1975; O'Connor, 1976; U.S. EPA, 1978).
>
> "Since the New York Bight is exposed to many pollutants simultaneously, it is expected that the available data on even two-factor interactions understate the nonreality of single pollutant endpoints. The development of matrices for the interaction of all possible pairs of pollutants is an enormous research undertaking. The resolution of this problem requires an alternate strategy for controlling pollutant discharges and a research effort in support of the strategy."

The Puget Sound Study revealed problems parallel to those of New York. The Southern California Bight appears to be exceptional. The currents close to shore are great enough to provide sufficient dilution to sustain a reasonable argument that effects of the wastes are small. The study is close to irrelevant; the same problems exist but they are developing less rapidly.

The fact remains that in both the Puget Sound Studies and in the N.Y. Bight the approach through estimates of assimilative capacity indicates (a) that by reasonable criteria based on requirements for human health the aquatic system has been degraded; and (b) the approach is of questionable effectiveness in offering criteria for regulation. The argument centers on whether the degradation is significant. The response is a judgment based on what one considers important. The risks to human health can be measured, if crudely, and may be discounted as small in proportion to other risks to health. In the ecologist's experience, for all toxins except ionizing radiation criteria for management based on human health are narrowly focussed and permissive. His evidence is that the world is a biotic system whose primary functions in support of man are those of the world's mostly unmanaged plant and animal communities that continue to dominate the biosphere. These communities respond to pollution in predictable ways described as "degradation" or "impoverishment". The pattern of change is well known both on land and in the sea; there is little that is uncertain about the causes or the result when considered in the broad context. The process is incremental and each increment appears small and insignificant. The results are cumulative and unacceptable.

I advance the observation, articulated many times before, that the cost of biotic impoverishment, whatever the cause or the place, is borne by all as a series of economic burdens including inflation (simply the cheapening of people), an increased incidence of disease, an increase in the price of fish as fish populations decline, a loss of opportunity to share clean water or to eat shellfish, or a loss of primary productivity, or recreational opportunities, or as a series of taxes imposed by government to repair or replace functions normally carried out by nature. We seek the protection by government from the erosion of commonly held resources and we seek, and may have to culture, the advice of the scientific community in developing a system that will work in preventing that erosion. The evidence of the most comprehensive study of assimilative capacity is that the current system does not work and probably cannot be made to work because the system is fundamentally permissive, keyed to apology for existing patterns of disposal, and open to continuous pressure to be more permissive rather than less. It solves nothing; it provides little more than a system of apology for the status quo. The NACOA Report of 1981 is the perfect example of unreasoned reasonableness in support of the destruction of the coastal oceans.

What is the alternative called for so eloquently by this report?

The answer is clear and has been for two decades or longer. Neither the Nation nor the earth as a whole can accommodate continuously expanding volumes of municipal and industrial wastes managed by the current system without progressive toxification of environment and impoverishment of the biota. The toxin-by-toxin approach cannot work: it is too complicated, too vulnerable to manipulation, and there are too many toxins released in too many different forms and places. Reason here becomes unreason; small amounts that are tolerable become torrents that are intolerable and uncontrollable. The solution is a complete reversal: the management of wastes on a no-release basis. The objective becomes the progressive closure of man-dominated systems.

The topic has been considered in various forms over centuries. In Blackstone's England the ancient Christian principle was invoked as the basis of the law of nuisance: "Use what belongs to you in such a way that you do not damage the property of others". It remains an appropriate challenge for a shrinking world and it is totally consistent with the need to start the laborious process of building closed systems for industry, for cities, and for human habitation. The closure of these systems is entirely consistent with widely accepted objectives in reducing per capita requirements for energy, water, and other resources as well as with the need to avoid global, man-caused changes in climate.

We hear enthusiastic discussion of re-industrialization, but the full range of possibilities escapes us. Why not include in this process, essential and inevitable as it is, the entirely reasonable plan of closing man-dominated systems, building these systems into mimics in their net effects on the biosphere of those natural systems they replaced. The world has an assimilative capacity for man and his works, but that capacity is not infinite, it is not easily measured, cannot be defined simply factor by factor, and is not amenable to manipulation by political or economic process or exigency. It is small and the cost of the growth of the human enterprise is that we recongize, nationally and, soon, globally, that there is an alternative to the presently humiliating, losing role that the scientific community seems to have accepted in defending a system of managing wastes that cannot succeed. The failure of the present system is fair warning, an opportunity to develop the alternative sought in the Crystal Mountain report.

The alternative has two elements, one based in science and technology; the second, in the regulatory process. The role for the scientific community is the invention of ways to close human systems progressively and economically. There is, for example, the possibility of reducing water use by any house to 1/10th or less of current requirements by separating the uses of water and recirculating a large fraction of it. Such a transition would suddenly relax needs for massive new water supplies and equally large new sewage disposal systems. Similar changes are possible in industry and are in fact underway. They must be encouraged with research and continuing governmental leadership.

Second, the system for managing wastes can be inverted and should be. The Assimilative Capacity model is failing. The alternative is a policy of containment including the recovery of wastes. Under the present policy we assume that there is an assimilative capacity for all substances until evidence appears as for DDT that the system does not and cannot work. There are too many toxins to proceed successfully with this approach on a substance-by-substance basis. A much more practical approach would be based on the opposite model: the assumption that nothing be released into the general environment until proven safe. The costs of managing, including recovering or storing or detoxifying wastes are appropriately assigned to the products of the industry, not diffused as a general cost onto the public at large. The possibility of progress in this direction has been emphasized recently by the state of California's analysis of its own problems with industrial toxins (State of California 1981).

The transition to such a system is clearly not an easy one, cannot occur abruptly, but must occur if we are to avoid the consequences of progressive toxification and impoverishment of the biosphere as a whole.

The circumstances that will make the transition possible are the joint activities of the academic scientific community, the private sector through the interests of industry and philanthropic groups, and continued wise and effective leadership of the federal government. I emphasize the federal role because of the need for nationwide planning, for progress internationally, and because all experience in the management of resources held in common suggests that management cannot be placed in the realm of the users without encouraging overexploitation.

The challenge is great, but the costs of failure are greater.

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Mr. SCHEUER. Thank you much, Dr. Woodwell.

Now we will hear from Mr. Willard Bascom of the Southern California coastal water research project.

STATEMENT OF WILLARD BASCOM, SOUTHERN CALIFORNIA COASTAL WATER RESEARCH PROJECT, LONG BEACH, CALIF.

Mr. BASCOM. Thank you, Mr. Chairman.

I have been an oceanographer for about 36 years now, involved in nearly every aspect of ocean research. At various times in the past and/or the present I have been on the research advisory boards of the AEC, the Navy, NOAA, EPA, the Corps of Engineers, and very likely some other ones.

Let me address myself first to some of your committee's questions about the status of ocean pollution research in the Americas today.

As to the state of it, as you already can guess, it is mixed. Some is good, some is bad. Some of the Government research has been very expensive and not very good—that is in-house research. Some of the work they have put out under contracts and grants has come out rather well. I think in both cases it turns out one of our greater problems is that the objectives of the research have not been very well thought out and the results have not been communicated, or passed along to those who can make use of it.

I think a greater question, perhaps, is whether or not the findings have gotten into the hands of the legislatures or the Congress, or city councils, or whomever, who have to decide environmental matters. Research by its nature is a little bit—it is clumsy, it is inefficient, goes slowly, it is full of blind alleys. It has all the kind of things wrong with it that everybody who has been in research knows well. And, yet, in the long run it is probably the best way to get where we are going. Questions relating to ocean pollution have been treated as contests, sometimes in public fora, revealing who thinks what about the sea. But the only way you can find out what does in fact happen is by looking in the sea, by going into details about the responses of various creatures to various contaminants, and finding out directly. Exactly how those results get passed on to legislative groups is not easy to see. I have found it is quite easy for somebody who, without very much information, can shout an alarm; after some period of time when scientists have very carefully dug into what actually did happen the answer is not very newsworthy, so no public response is ever made. The result is that the public has received a somewhat one-sided account of research that has been done. The questions have been raised but the answers to them have disappeared.

As to the state of the art in ocean research today, the phrase "state of the art" kind of implies that somewhere out there is a leading edge that is the state of the art. It means the topnotch research is going on right this moment. But what is happening on that front rarely gets communicated back down the line, so there is a great body of people who operate on what has been learned in the past and who are not aware of things that are already part of the state of the art.

I should like to give you two examples of that that relate to toxicity in sea animals. Perhaps I should say first that a year or two ago I shared the generally accepted views on toxicology. Now I have been led by recent findings to believe that contaminants in the sea are nowhere near as toxic as I had once thought they were. In the case of the so-called toxic metals, for example, in the last few years—I can't say exactly when this began but maybe 5 years ago and since then—it has been discovered that all animals, including the people in this room, in their liver cells, GI tract cells and kidney cells, manufacture a protective protein named metalathione.

Now, many of the measurements that have been made of sea animals have made a gross measurement of the amounts of metals, in the liver of some sea creature. Looking at that gross measurement one might say "That is way too much of that metal. That animal's in danger."

On closer inspection, if you take that liver material and separate it into molecular weight fractions and then run this by each fraction what you then discover is the place, the location where the metals would be toxic—generally in the high molecular weight fraction which contains the enzymes, the messenger DNA, and some of the genes—those areas very low in metals. Copper and zinc, which are regular body requirements for enzymes, run about the same as always. But in the middle molecular weight fraction this protein named metalathione sucks up all the rest of the metals and holds them there away from the sites of toxic actions. So these animals, even though they do take up levels of metals are protected from damage by metalathione.

The same turns out to be pretty much true in the case of the chlorinated hydrocarbons, which only a year or two ago I, myself, was very concerned about. I worried about what chlorinated hydrocarbons could do. We have recently found a body of research done mainly by enzyme people working on mammals which, as far as we can tell so far, apply essentially to all animals—but the work has been mainly done on mammals. When molecules of the DDT—I will stick with DDT but the other chlorinated hydrocarbons, PCB, PCP—enter the liver tissue or appropriate other tissues of an animal they are then attacked to some extent by the mixed function oxidaze enzymes. Next an epoxide intermediate forms which at once becomes stuck onto a tripeptide named glutathione to which it remains attached and where it is then attacked by other enzymes. The result is that within the body of the animal the DDT is actually broken down, and the resulting products are DDOH plus carbon-free chlorine, and such.

I puzzled for a long time about how the environment can ever get cleaned up if, for example, things like DDT are discharged to it. What we discover by looking at the metabolic products of a single animal is that the DDT quickly goes to DOE, DDD and thence to DDA, DDOH and so forth, and finally simply disappears within the animal. So in fact animals, while not only taking care of the toxins as far as they themselves are concerned, are actually cleaning up the environment at the same time.

Now, I think that is a tremendous piece of information to have because it gives you some explanation why low levels of these admitted contaminants simply do not seem to be toxic. Now, at high level there is no question but that they are toxic. But the problem has been that, our discharges in California, contain levels of DDT and PCP on something of the order of one part per billion. Now, I never heard of anybody who thinks it is a good idea to put DDT and PCP in the ocean. The question is how do you not put it in the ocean when you are dealing with huge volumes of water that and those tiny quantities of contaminants? How would you remove them? They don't come out in any known treatment method. So I think the next thing you do is look and see what actually happens in the sea. Our research has been concentrated almost entirely on measuring sea animals in the conditions in which they actually live and trying to find out what is wrong with them there.

I point out those two cases as an example of a situation where the leading edge of research is far ahead of what most people know about and the research being done by Government laboratories.

One of the other questions your committee has asked is what kind of things do we need to know. I think, by the way, that our lab right now can answer nearly all the kind of questions that have been mentioned at this table today and a great many more, at least for the southern California region. The extent to which those apply elsewhere in the country we are not quite clear, but in the main the basic characteristics of biology and chemistry apply everywhere.

As for three specific kinds of research which I think need attention; first of all the area which I just mentioned, these fancy protective enzymes and tripeptides need to be examined carefully. Most of all we need to know the rate at which those are manufactured in animal bodies. That is what we don't know. At certain levels we know the level can continue to rise and at some rate of rise the rise of metals is matched by metalathione. We don't know those rates. We would love to have research money to do that with.

I think realistic toxicity tests ought to be instituted which would be quite different, whatever they may be, from the present tests where animals are put into clean water and glass tanks and suddenly given a big jolt of some unexpected contaminant. They are not able to manufacture either metalathione or glutathione rapidly enough to meet with it. Those tests are totally unlike the realistic situation in the sea where contaminants tend to be attached to particles, from which they would diffuse very slowly, probably not big enough to cause toxicity.

The third item on which I suggest work be done on is to put numbers on "assimilative capacity." It is a phrase that I think Professor Goldberg coined some years ago, and I have always been puzzled by it. Clearly the business of science is to put numbers on things, and I think it is quite possible to put numbers on the extent of assimilative capacity; many of the data are already in hand. I think with certain kinds of additional data and new kinds of specific sorts of tests we can say: This is what the available assimilative capacity of some body of water is; this is how much has been used already. With these data, an administrative agency such as NOAA perhaps will say, OK, you may use up to 25 percent of the total capacity, for example.

Finally, I would like to say again that although it frequently has been alleged that the ocean environment is very fragile, I do not agree with that statement. I find it very tough and very resilient. I am astonished to find how rapidly sea life comes back again to areas which have been damaged in the past after the damage has ceased.

We always look for animals which indicate what is going on. One of the those that we deal with in southern California is a quarter-sized little critter called amphiotica ertica. It lives in great abundance all up and down the coast. It is very easily removed from an area by any sign of contamination or pollution. It goes away. Therefore, it is perfectly fair to say that you could use this animal all by itself to indicate the extent of areas damaged by or changed by pollution.

I have computed that the remaining number of amphiotic along the California coast on the shelf between Point Conception and the Mexican border at 10_{13} of those animals. Now I ask myself, it is possible that you can damage an animal which is present in that fairly restricted area at a level of 10_{13}? Would it be helpful to the environment if there were 10_{14} there? My answer is that I doubt that. However, that is the kind of problem one faces.

I would like to say that I agree with Professor Goldberg that I think much more is known about the ocean environment than is known about the land environment where the materials that are to be disposed of would be put instead. I should like to close with that.

Thank you, sir.

[The prepared statement of Mr. Bascom follows:]

Testimony of Willard Bascom
before the

Subcommittee on Natural Resources, Agriculture, and Environment of the House Committee on Science and Technology.

I have been involved in ocean research for 36 years via the University of California, the National Academy of Sciences, and some corporations.

I am the author of several books and numerous scientific papers, and the editor of a series of annual-biennial reports on pollution research. I am a member of the National Sea Grant Panel (NOAA), the Coastal Engineering Research Board (Corps of Engineers) and, until recently, the Ocean Science Board of the National Academy of Sciences.

For the last 9 years, I have been director of the Southern California Coastal Water Research Project - a scientific organization sponsored both by local governments and federal agencies (NSF, NOAA and EPA). Our objective is to understand the ecology of the coastal waters of southern California, expecially with respect to the effects of the daily discharge of a billion gallons of municipal waste water.

The following is a brief statement of my views on the first question asked by this subcommittee:

1. The state of the art in ocean pollution research .

"State of the Art" refers to the best science/technology available. Inherent in this phrase is the idea that some scientific findings and concepts are far ahead of those that are generally accepted and utilized. In the understanding of ocean pollution, the gap between the leading edge of research and the government's apparent knowledge of new findings is wide.

In the last year, for example, our laboratory has shown that many of the contaminants previously believed to be toxic at low levels to sea animals, are in fact not toxic, because these animals have natural protective mechanisms built into their cells. These recent scientific findings have tremendous implications for every action we take relative to marine pollution.

I refer to the discovery, largely by Dr. David Brown of our staff, that sea animals, and indeed all animals, have a substantial natural capacity to protect themselves from contaminants. They protect themselves against the so called "toxic" metals (copper, zinc, cadmium, chromium, nickel, lead, silver, mercury) by manufacturing a special protein named metallothionein in liver and digestive tract cells. This protein sequesters (holds onto) ions of metals and prevents them from interfering with enzymatic processes, which is the main way that metals have a toxic effect. For example, EPA personnel have been puzzled by the fact that in certain streams where the copper and zinc concentrations are above the accepted lethal dose, fish and other animals appear to be in good health. The explanation is that the fish produce enough metallothionein to protect themselves -- in total disregard of the government's standards.

Another body defense (mainly in the liver) is a tripeptide named glutothione. It acts in a similar way to sequester or conjugate "epoxide intermediates" which are the toxic forms of chlorinated hydrocarbons. These epoxides are formed when, during the metabolic process, chlorine atoms from such contaminants as DDT, PCB, and PCP are replaced by oxygen. Then the glutothione reacts with the epoxides, the latter are rendered non-toxic. It has been shown repeatedly that toxic effects occur only after all the glutothione has been utilized. The above has been known throughout most of the 1970's from the work of Dr's. Brodie, Jerina and Miller. Fish are known to increase their supply of glutothione by 500% in response to excess hydrocarbons. At the expense of some metabolic energy, the animal not only protects itself, but helps clean up the enviornment.

There is no question that metallothionein and glutothione act approximately as I have just indicated . However, if the concentration of metal ions or chlorinated hydrocarbons rises too rapidly, the cells cannot manufacture these two materials fast enough. In the sea, for various reasons, it is unlikely that a rapid rise can take place as it does in a laboratory tank. So, although we do not have enough information about the rate of manufacture of metallothionein and glutothione, we are sure that in the form and at the concentrations likely to be encountered in the sea as a result of thoughtful waste disposed, there is little danger of damage to sea animals.

As far as I know, the above findings have not been taken into account by waste regulators, nor have they sponsored any research into these matters. This is illustrative of the gap between the state of the art and pollution research today.

The findings just refered to throw doubt on the validity of the toxicity tests used to set waste disposed standards -- and thus call to question the standards themselves and the agencies who set them. I point this out because much of the existing legislation intended to protect the marine enviornment has been based on inaccurate and now outdated information. These and other new findings are causing scientific attitudes to change. Perhaps at one time the information available about conditions in the sea was inadequate and it was logical to prevent any kind of discharge or dumping. That is no longer true. I think it is very likely that more is now known about life in coastal waters of the U.S. than is known about the corresponding life on coastal lands.

2. Research Needs

The findings I have just described about natural detoxification need to be ardently pursued. So far only enough research has been done to learn how the protective mechanisms operate. Although this is of great value to understanding toxicity in the environment is is far from a complete answer. Now we need to discover what triggers the manufacture of these protective proteins and the rates at which they are manufactures by various kinds of animals. This is one of the rare examples of research that is both good basic science and also of immediate practical use. It should be enthusiastically supported.

The results mentioned have cast doubt on most existing toxicity tests (96 hour exposures in clean water for LD50) but there is no clear answer to the question of what sort of tests should be run instead. Research should be done to develop realistic tests of toxicity in the sea and to use the results to develop new standards.

In recent years we have often heard that the assimilative capacity of the sea is under-utilized. That may be true, but at this moment no one can say either what the ultimate carrying capacity is or what percent of it has been utilized in any specific area. Numbers are needed if this catchy phrase is to be converted into a useful management tool.

3. Opportunities

Some of the public has been led to believe that the ecosystems of the ocean are fragile and easibly destroyed by man's wastes. My observation, based on many scientific measurements, is that, far from being fragile, life in the sea is very resilient. Moreover, most of the species we ordinarily deal with are widespread and very abundant. These creatures defend themselves against man's wastes with the same techniques they developed over millions of years to defend themselves against metals and hydrocarbons that are naturally present in the environment. Communities of animals adjust themselves in such a way that those who are best fitted take advantage of the local changes caused by man and increase -- as they would in response to natural changes. Those not adapted survive and flourish elsewhere.

None of these remarks are intended to support the reckless use of coastal waters for disposal of any amount of any kind of waste.

The intention is to point out that there are great opportunities in research. I am quite sure that more detailed and thorough scientific studies will further support the things I have said. However, subsequent work undoubtedly will develop additional complexities and require adjustments in our outlook. I hope we will soon reach the time when actual measurements in the sea will supplant the imaginative ideas about what happens on which some regulations seem to be based.

Regarding Questions 2, 3 & 4

The role of federal and state governments is to support research which can give meaningful help to those who set standards and make laws.

The Federal Government will get more for its money by supporting independent groups than by trying to do the research in its own laboratories. It can be more flexible, obtain the service of better scientists, and save money by doing contract research. State governments are subject to political pressures so that the object of "research" often is the study some minor local problem. Generally speaking, this kind of "applied" research is a sham and a delusion, intended to solve political but not scientific problems.

The quality of (internal) government research in ocean pollution has not been very good. Although a lot of money has been spent, as far as I know, there are no publications that describe whatever general truths have been learned about the New York Bight, Dump site 106, or the Boston, Seattle, San Francisco and Miami areas in a form that could give guidance to a legislator. There may have been some thick reports containing unconnected kinds of (often) unevaluated data.

New thinking is needed that will produce products that are more useful in guiding the Congress and the regulatory agencies.

As for the comparison of impacts on land with those in the sea (an idea I have pushed and testified in favor of for years) the problem is not with our ability. We can do it anytime the funds are made available. You may be interested to know that a specific study in California that was supposed to make a land-sea comparison was prevented from doing so by EPA (previous administration) on the ground that ocean disposal was illegal and they could not spend federal funds to study it. In another case, EPA avoided obtaining comparable data on land dump site because they were not required by law to file an Environmental Impact Statement.

I can summarize my views in three pieces of advice:

1. Do not cut the ocean pollution research budget. Research leads to understanding and understanding will save money or better protect the enviornment. The alternative to research is to spend more money than necessary on treatment plants, trucking, land disposal, etc., to meet regulations that are not based on what really happens in the ocean.

2. Put your faith in scientific findings based on actual measurements. Scientific research can be slow, full of blind leads, and inefficiency, but when you finally learn the right answer, it is very valuable. For years we have heard the argument that we should be conservative if we're not sure what we're doing. I agree. However, conservatism can be expensive. It is well worth-while to find out what the actual effects of waste disposal is by using scientific methods. Then, perhaps the regulations can be modified.

3. Encourage the government agencies to do two things:

1) Think more carefully about long range problems and what needs to be known to answer them. Then spend research money on research that will produce a fundamental understanding so we can act appropriately. 2) Develop reliable research capabilities outside the government. These are likely to be more flexible and less expensive. Often outside groups have better scientists, know more about the sea, and use much smaller, less expensive ships.

Mr. SCHEUER. That was very interesting. Thank you very much. Now we will hear from Mr. Kenneth Kamlet of the National Wildlife Federation.

STATEMENT OF KENNETH S. KAMLET, NATIONAL WILDLIFE FEDERATION

Mr. KAMLET. Thank you, Mr. Chairman.

I would like to highlight in my oral remarks two issues that relate to the connection between ocean pollution research and monitoring and the regulatory aspects of ocean dumping.

I would like to begin by noting that the proposed phaseout of NOAA's research on waste disposal in the marine environment and the proposed termination of the sea-grant program could not possibly have come at a worst time.

For one thing, it seems disingenuous in the extreme for an administration which has so sharply criticized environmental regulation as based on inadequate science to so devastate the scientific support framework for most of the research and monitoring needed to maintain a credible ocean dumping regulatory effort.

For another thing, if one views these drastic cuts in the Federal marine pollution research and monitoring capability in conjunction with the pending changes in the ocean dumping regulatory program which are now underway at EPA, it is very hard to escape the conclusion that the administration supports more waste disposal in the ocean and not only does not care about the consequences, but prefers not to know.

Specifically, drafts we have seen of revisions to EPA's ocean dumping regulations reflect the Agency's strong determination to deemphasize before-the-fact screening of wastes proposed for ocean dumping in favor of after-the-fact monitoring. A new category of so-called special care permits would be created to authorize the dumping of many kinds of potentially hazardous waste which would not meet current testing requirements and could, therefore, not lawfully be ocean dumped under the present regulations.

Unacceptable harm to the marine environment under the EPA proposals would be minimized, hopefully, by designing and operating monitoring programs to determine whether dumpsite use should be restricted. Although the draft regulations contemplate that initial responsibility for developing and implementing such monitoring programs would fall on the permitee, they also project that EPA would conduct studies and surveys to assure that the permitee's monitoring program is adequate.

These proposals, particularly viewed in conjunction with the administration's budget submissions, disturb us greatly for a number of reasons. First, reliance on after-the-fact monitoring is a risky proposition. Not only are there serious gaps in the ability of marine science to measure and properly interpret any but the most drastic pollution impacts in the marine environment, but, assuming this ability, given the after-the-fact nature of this approach, much of the damage is likely to have been done before any corrective action can be taken. It is a little like the difference between an immunization program to prevent polio and waiting for the disease to develop before the doctors intervene.

Second, EPA's past performance in the monitoring of ocean dumping impacts leaves much to be desired. Indeed, apart from site designation studies and a small handful of limited and low-level forays into dumpsite monitoring, most of the information gathered to date about ocean dumping impact has come from monitoring conducted or funded by NOAA. With the reductions I understand the administration desires in the operation of EPA's three marine research labs, it is hard to imagine how EPA could hope to mount any sort of conscientious site-monitoring effort.

As EPA's Acting Assistant Administrator for Water and Waste Management told the House Oceanography Subcommittee as recently as last May 14:

> EPA is concerned about the relatively low level of understanding of the impacts of ocean dumping and the duration or reversibility of those effects. NOAA has conducted preliminary surveys in the New York Bight at the 12-mile and 106-mile sites, but this program has been limited by funding constraints. We are in full support of NOAA's budget request for this type of effort.

The same budget that has now been severely eroded to an even greater degree.

Mr. SCHEUER. Let me just interject here that we have directed EPA to organize with NOAA a cross-media study of the degrading effects of ocean dumping at the 12-mile site and at the 106-mile site. We have asked them to compare the degrading effects of dumping at both of those sites with the effects of land and air disposal. In other words, comparing by incineration and by spreading out the toxic substances over our parks and playgrounds, as EPA wanted us to do.

That was why New York City brought the legal action against EPA that would require them to permit ocean dumping. We felt that there was a tremendous need for some cross-media studies comparing the effects of disposal by land, by sea, and by air, to find the least environmentally degrading means of disposal. It is all relative. It is all a question of which system—the system of land disposal, the system of air disposal by incineration, or the system of ocean disposal—is the least environmentally degrading and presents the least health effects to human beings.

You are right on target, but I feel constrained to add that we already have ordered EPA to organize such a joint cross-media research project with NOAA. We expect to hear from them shortly.

Mr. KAMLET. Mr. Chairman, may I react briefly to that? I certainly agree with you that there is a compelling need for that sort of cross-media evaluation, but it seems to me in the specific instance of New York City sewage sludge dumping that there is a third option that ought to be considered and which may provide the opportunity for minimizing risk to the fullest possible extent, which I am afraid EPA is not pursuing at all. I would like briefly to describe what that is.

As you know, Mr. Chairman, the sewage sludge that is generated by New York City is not monolithic; it comes out of about a dozen different sewage treatment systems within the city system. Some of that sludge is the product of a very heavily industrialized sewage treatment system. The majority of the sludge is much less industrialized than that small minority.

It seems to me, Mr. Chairman, that the environmentally preferred option available to New York City and EPA in that context would be to allow the cleaner sludges to continue to be ocean dumped, perhaps even at the 12-mile site, but for the more contaminated, industrialized sludges, to place those not in parks and playgrounds, but on the landfill sites that the New York City contractor, Camp, Dresser, and McKee, had already identified.

When we were talking about the entire output of the city's sludge, that alone would not have been sufficient to accommodate it. However, if you focus solely on the heavily industrialized sludges—and I have not done the arithmetic—I feel pretty confident that all of that industrialized sludge could be safely accommodated at those landfill sites. I far prefer to see that stuff put on the landfills in a one-shot application for 5 to 7 years to allow an incineration capability to be developed for it than to have that contaminated sludge continue to be put in the ocean, whether at the 12-mile site, the 106-mile site, or the 60-mile area.

Mr. SCHEUER. Is one of those sites the Starett City site adjacent to Kennedy airport?

Mr. KAMLET. I am not sure, Mr. Chairman. These are existing city-owned landfills that have been used for solid waste disposal and are at or near the end of their capacity for solid waste disposal. Sludge application would be a final capping effort that would help to stabilize the landfills and revegetate them. I am not sure of the details right now of the locations of them. I could provide that for the record if you wish.

Mr. SCHEUER. Are they inert after they have been capped and vegetation has been planted on them?

Mr. KAMLET. I would not presume to say they would be totally inert, but I would venture to speculate that they would be more inert than they currently are. There certainly is a significant amount of leachate that comes out of those landfills at the present time as a result of the solid waste disposal that has occurred there. Any stabilization that occurs can only in my view improve the situation rather than contribute to any leaching that occurs. It seems to me from a variety of standpoints, including cost by the way, this would be far cheaper to the city than moving the entire aggregate of sludge out to the 106 site, which seems to be EPA's current orientation, or at least moving them out to the 60-mile site.

To the extent you could use your good offices to encourage EPA to seriously consider that alternative, I think it would be very desirable for that to happen.

Mr. SCHEUER. I would be happy to urge them to do that. First, of course, I would want to make sure that none of those sites are in the 11th Congressional District. [Laughter.]

Mr. KAMLET. There may well be sufficient capacity outside the district to handle the material.

I would like to continue my statement briefly, Mr. Chairman.

To the extent that an effective ocean dumping research and monitoring effort depends on an active involvement by NOAA, as Congress I think clearly contemplated in conferring on NOAA primary responsibility under title II of the ocean dumping law for that kind of research, the administration's proposed phaseout of NOAA's marine waste disposal research program makes an unfortunate situation even more unconscionable. To return to my polio analogy, it is akin to telling the patient heal to himself.

I would like to raise a second major issue that concerns EPA's ocean dumping program. One of the most important components of this program relates to the agency's long-delayed efforts to study the ocean dumpsites that have been approved for use over the past decade to hopefully determine whether these sites are in fact suited to receive the kinds of waste that are dumped there. This is not an idle exercise undertaken to satisfy vague curiosities.

Under section 102(c) of the ocean dumping law, the EPA administrator may designate recommended sites for dumping only after considering environmental impact criteria established pursuant to section 102(a). Under the London Dumping Convention, which is fully binding on the United States, the mandate is even clearer. Under article 4(a) of the convention, no ocean dumping permit can be issued except with prior studies of the characteristics of the dumping site.

Based largely on the Wildlife Federation's vocal criticisms of EPA's practice of approving dumpsites strictly on the basis of historical usage without regard to prior to study, EPA grudgingly addressed the site study issue in its 1977 regulations. What it did at that time was to blanketly designate as interim approved a long list of 140 unstudied ocean dumpsites for up to 3 additional years. The regulation specified that this list would remain in force for a period not to exceed 3 years, with any sites not given final approval during this period no longer being available for ocean dumping.

Well, 3 years later, with virtually no site study work completed, EPA issued another Federal Register notice extending the interim-approved status of the sites on the 1977 list, with a few additions thrown in for good measure. We promptly sued EPA and the Corps of Engineers in February 1980. When the dust finally settled, we had secured a court-approved settlement agreement, which is exhibit 2 to my prepared statement, dated September 25, committing EPA to completing site studies and designations in accordance with a prescribed schedule for the 22 most actively utilized dumpsites around the country. Two months later EPA dutifully published another Federal Register notice, exhibit 3, incorporating with a few changes the schedule reflected in the court order.

Where do things stand on site designation efforts at EPA? Last spring EPA decided to phase out its contract with the consulting firm which was to do most of the site designation studies for EPA. By mid-May of last year an EPA official indicated, exhibit 11, that site designation work for only 1 of the 22 sites covered by the court order was proceeding on schedule. For the other 21 of these 22 sites, the estimated date for final designation was to be anywhere from 4 months to 16 months behind schedule.

There undoubtedly has been further slippage since that time. For example, the draft site designation EIS on the dredge spoil dumpsite, the mud dumpsite, in the New York Bight, which under the May revised schedule was to be completed last October, was not issued until last week. Its original due date under the court order was December 30, 1980, 14½ months ago. I understand that in the aftermath of the budget and staff massacre at EPA original fiscal year 1982 plans to complete designations on five sites were scaled down to encompass only three dumping sites.

Mr. Chairman, I can only say that the situation in this regard is preposterous and intolerable. I hope that this subcommittee will forcefully pursue the site designation issue with EPA representatives when they appear before you. For our part, Mr. Chairman, it is increasingly hard to forego contempt of court proceedings against the EPA Administrator on this matter. I expect that before too long we will be forced to adopt that approach.

In conclusion, the proposed phaseout of NOAA's marine waste disposal research program simply heaps scorn and contempt on top of insult and injury.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Kamlet follows:]

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STATEMENT OF KENNETH S. KAMLET ON BEHALF OF THE NATIONAL WILDLIFE FEDERATION, AT THE HEARING ON OCEAN DUMPING AND OCEAN POLLUTION RESEARCH, BEFORE THE SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH, AND ENVIRONMENT OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY, HOUSE OF REPRESENTATIVES, FEBRUARY 25, 1982

Mr. Chairman and Subcommittee Members:

I am Kenneth S. Kamlet, Director of the National Wildlife Federation's Pollution and Toxic Substances Division. My training is as both a lawyer and a biochemical scientist (Ph.D. minus dissertation from Yale University). I am here on behalf of the National Wildlife Federation and its 4.6 million members and supporters (and its 53 state and territorial affiliates).

The Chairman's invitation letter requested comments on questions in five broad issue areas. With the Chair's permission, I would like to concentrate on three issues: the timeliness and relevance of Federal ocean pollution research in relation to the ocean dumping regulations; ocean pollution research needs; and enhancement of our ability to make cross-media assessments of waste disposal impacts.

Six-and-a-half years ago, this Committee held a series of hearings on "The Environmental Effects of Dumping in the Oceans and Great Lakes" (Hearings Before the Subcommittee on the Environment and the Atmosphere of the House Committee on Science and Technology, 94th Cong., 1st Sess., No. 55 (1975); hereinafter, "1975 Hearings"). In testimony presented at those hearings, I identified "eight priority research needs which [the National Wildlife Federation] view[ed] as

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vital supports for effective ocean dumping regulation." 1975 Hearings, supra, at 26-29. Unfortunately, today--in 1982--a decade after Congress enacted the Ocean Dumping Law, many of these key research needs remain unmet.

The eight research needs we identified, and our assessment of their present level of fulfillment, can be catalogued as follows:

1. Screening criteria for dredge spoil (absence of standards or criteria to prevent highly polluted dredged material from being ocean-dumped). Status: Reasonably good dredged material criteria were incorporated in the 1977 revisions to the Ocean Dumping Regulations and Criteria (in response to an NWF lawsuit). However, Corps of Engineer practices in implementing these regulations, frequently leave much to be desired. I have identified a number of these implementation problems (many of which raise basic scientific questions which deserve more study) in a paper currently In Press. Relevant excerpts are appended as EXHIBIT 1. In addition, draft revisions to the Ocean Dumping Regulations--currently underway at EPA--will, if retained in the final, published version, drastically weaken the current regulatory regime and again highlight the need for adequate dredge spoil screening criteria.

2. "Trace contaminant" limits for mercury, cadmium, organohalogens, and oils and greases. (This derives from the London Dumping Convention ["LDC"]--an international ocean dumping treaty to which the U.S. and most of the world's ocean dumping nations are parties--which prohibits the dumping of these four classes of constituents as other than "trace contaminants," but does not define the phrase.) Status: The 1977 revisions to the Ocean Dumping Regulations adopted a working definition of "trace contaminants" which relies on bioassay and bioaccumulation testing (i.e., measures of biological effects). Although

the use of a "toxicity threshold" procedure of this kind is not inherently inconsistent with LDC requirements, the almost total de-emphasis of chemical characteristics (particularly for dredge spoils, the composition of which cannot be known without specific analysis), seems unjustifiable (and unlawful). For example, the bioassay tests prescribed in the Regulations are not capable of detecting carcinogenic or mutagenic effects, or chronic impacts such as impaired reproductive potential; knowledge of chemical identities could, in many cases, identify potential hazards worthy of further evaluation. Similarly, without chemical characterization of the material proposed to be dumped, it is difficult to imagine how rational decisions could be made as to which chemicals to test for in subsequent bioaccumulation tests. Again, to make matters worse, EPA is seeking to revise the Regulations to relax applicable testing requirements, and to make the regulatory impact of test results discretionary rather than mandatory.

3. Improvement and expansion of other waste-screening criteria, so that dangerous wastes can be identified as such at the predumping stage and kept out of the ocean wherever possible and appropriate. As we noted at the 1975 Hearings: "Bioassay procedures must be further refined and improved so that chronic and sublethal toxicity, and not simply acute lethality, can be evaluated"; and "procedures need to be developed to detect mutagens, teratogens, and carcinogens; to test organic compounds for biodegradability under disposal-like conditions; to predict the dispersion and ultimate fate of ocean-dumped pollutants; and to avoid the ocean dumping of pathogens which may survive and spread infection" (at 28). Status: Virtually all these needs remain today. Moreover, changes EPA is seeking in the Ocean Dumping Regulations would

dramatically shift the regulatory focus from pre-dumping screening to after-the-fact monitoring--a change which might be compared to the difference between preventive medicine and radical surgery. Indeed, in this case, given the Administration's parallel reductions in the budgets for ocean dumping research (particularly at NOAA), we may actually be talking about letting the patient recover (or not) on his own, with little if any medical intervention.

4. Development of disposal site selection criteria capable of matching ocean-dumped wastes to disposal sites best able to safely accommodate them. As we noted at the 1975 Hearings (p. 28): "Among the relevant considerations is the desirability of encouraging dispersal versus containment of a given waste type. For example, in the case of nontoxic and/or biodegradable wastes, where physical and short-term impacts may be of greatest significance, maximum dispersal might be the objective; whereas, in the case of toxic and/or nonbiodegradable wastes, where toxicological and longer term impacts may be more important, the goal might be maximum possible waste containment." Status: The conclusion of the House Merchant Marine & Fisheries Committee in a 1975 report remains equally apt today:

> ...[T]he present program of scientific evaluation of dumpsites and waste materials is not adequate. If our nation is to terminate all ocean dumping not clearly demonstrated to be safe, the dumping sites presently used must be properly studied to determine the effects such disposal is having on our marine ecosystem. Further research must be conducted to establish the basic criteria with which to evaluate disposal permit applications. Existing knowledge is not adequate to accomplish these objectives, and only by a continuing program for evaluation and research can our Nation ever expect to meet its obligation for the proper regulation of ocean dumping.

H.R. Rept. No. 217, 94th Cong., 1st Sess. 5 (1975). Although the 1977 Regulations included site selection regulations for the first time, these regualtions failed to take adequate account of what type of disposal site best fits what kind of waste. But, even if one were to concede the adequacy of the present regulations in this regard, the sorry state of affairs is that, of 144 ocean dumpsites given blanket "interim-approved" status by EPA, only 11 have been formally studied and designated by EPA. Indeed, even in the aftermath of a successful NWF lawsuit on this issue against EPA and the Corps of Engineers (NWF v. Costle II, Civ. No. 80-0405, Stipulation of Settlement and Dismissal, D.D.C. Sept. 25, 1980), which committed EPA to accelerate its site designation schedule for the country's 22 most heavily utilized ocean dumpsites, considerable "slippage" has occurred, so that final site designation decisions must be regarded as still years away for the vast majority of even these priority sites. We noted in 1975 that, "in the meantime, ocean dumping goes on at sites selected on no better basis than historical usage." 1975 Hearings, p. 28. The situation is little better today. The only difference is that now EPA is in violation of a court-approved stipulation and its own regulations, in addition to running afoul of the site study requirements of the Ocean Dumping Law and the London Dumping Convention. Copies of the stipulation and of EPA's 1980 Federal Register notice ("rule") are appended as EXHIBITS 2 and 3.

5. Basis for rationally setting discharge conditions (i.e., should the barge be moving quickly or slowly?; should the waste be released all at once or gradually?; should it be released at the water surface, deep below it, or dispersed into the air?; how frequently should the barge be permitted to dump?). A recent NOAA report indicates that it may well be possible, through the use of satellite imagery, to determine whether the currents at a given ocean dumpsite (notably, Deepwater Dumpsite 106) are predominantly onshore or offshore at a

given time (which will have a significant bearing on whether contaminants may be transported into ecologically sensitive nearshore waters, or on the likelihood that ocean-dumped constituents will wash-up on beaches). Such information, if coordinated through regulatory authorities could be used to adjust the timing of dumping operations to minimize the risks to human health and the environment. Status: The answer to many of these questions will depend on whether it is desired to encourage waste dispersion or containment. We are aware of no research along these lines in connection with ocean dumping. Moreover, the proposed radical reductions in NOAA's marine pollution research budget for FY '83, if approved by the Congress, would virtually assure that such research is not done.

6 and 7. Development of adequate monitoring criteria for both the disposal site and the general marine environment, capable of detecting adverse pollution impacts soon enough to do something about them. Status: There continues to be a critical need for sensitive methods of detecting small changes in ecological diversity and stability, primary productivity, and other early indications of ecological stress. The problem, as noted in a 1975 National Academy of Sciences (NAS) report (Assessing Potential Ocean Pollutants), "the natural variability in natural systems is usually high, so that only large changes can be detected with certainty." Unfortunately, the tendency in recent years has been to assume that, if we can't measure it, it doesn't exist. I am perhaps less willing than many scientists and political appointees to assume that our concerns of a decade ago about the impacts of ocean dumping were ill-founded simply because limited studies of the marine environment have not proved able to document catastrophic pollution impacts on the marine environment. As noted by an earlier NAS panel:

"Action on the pollution problem cannot be put aside while scientists unravel the complexities of ecosystem integration. We must take whatever steps are possible with the knowledge currently at our disposal." (NAS, 1971. Marine Environmental Quality, p. 59). Neither the draft revisions to the Ocean Dumping Regulations nor the Administration's proposed FY '83 marine pollution research budget gives cause for optimism that ocean dumping monitoring needs will be met any time soon.

8. Research into the fate and pathways of marine pollutants that enter the biological foodchain, as an aid to the development of seafood contamination criteria--toxicological as well as microbiological--capable of adequately safeguarding the public. As an indication of the importance of an adequate seafood screening program, levels of cadmium--for which no FDA guideline has yet been established, but which is never-the lesshighly toxic--levels in excess of 3 ppm were found in calico scallops and North Atlantic oysters as part of the National Marine Fisheries Service's "Microconstituent Resource Survey." An EPA study of scallops near the ocean dump site for Philadelphia sewage sludge (when that dumpsite was still active) found cadmium levels as high as 59 ppm. Yet no regulatory agency monitors human seafood for this highly toxic chemical, one-hundredth of a part per million of which is grounds for rejecting a drinking water supply. Even in the case of bacteria, which are monitored in certain shellfish, a 1973 General Accounting Office Report still found that substantial quantities of shellfish not meeting National Shellfish Sanitation Program bacteriological standards are reaching the consumer. All of us who eat anything from the ocean are taking something of a gamble, which is in part increased because

of ocean dumping. *Status*: The state of our knowledge regarding the fate and effects of marine pollutants is little more advanced today than it was a decade ago. Although there are now indications that heavy metals are not readily biomagnified through marine food webs (but biomagnification still occurs in avian and terrestrial predators), other toxic chemicals--notably chlorinated hydrocarbons--are readily transferred through the food chain. It is because of the profound gaps in our knowledge of the effects on marine pollution, on fisheries resources, for example, that it is particularly unfortunate that the Administration has proposed to terminate funding for NOAA's Hudson River-Raritan Estuary Project (H-REP). The major goals of this project are to quantify the flux of pollutants from the Hudson-Raritan estuary to the New York Bight apex and to determine whether any of the observed decline in fishery production in the Apex is attributable to pollution.

Two additional ocean dumping research needs loom large in light of recent developments:

9. *Reliable procedures and data for assessing assimilative capacity* of coastal ocean waters. With the renewed interest expressed recently in the ocean's "assimilative capacity" for waste materials, it is especially important that appropriate parameters and end-points are utilized in assimilative capacity assessments, and that adequate data are available for this purpose. I have appended as *EXHIBIT 4* an article from last spring's issue of *Oceanus* magazine, which discusses some of the pitfalls in over-zealous reliance on the concept of "assimilative capacity" of the ocean.

10. *An adequate basis for multi-media environmental assessments*. There has been an increasing unwillingness to accord the ocean environment any form of "special treatment"--in terms of erecting any greater

regulatory barriers to ocean disposal than to waste disposal in any other environmental medium. Although I would submit that the ocean requires special protection, as an unowned, free dumping ground, not subject to the marketplace and political processes that operate on land, multi-medium comparisons should and will be made. Appropriate evaluation criteria must be employed to ensure proper comparisons. It is also important that the initial comparison be made strictly on the basis of environmental considerations, so the most environmentally sound option can be clearly identified. If another alternative is later selected based on economic or other factors, at least the trade-offs will be explicity and important societal decisions will have been made out in the open. A paper describing a simplified procedure for comparing the environmental implications of sludge management alternatives is attached as EXHIBIT 5.

11. An appropriate basis for assessing the relative merits of deep versus nearshore ocean disposal. The Ocean Dumping Law requires a preference to be accorded to ocean dumping beyond the edge of the Continental Shelf. However, the scientific wisdom of off-shelf dumping has been questioned, and only two off-shelf ocean dumpsites currently exist off U. S. coasts (Deepwater Dumpsite 106, at the edge of the New York Bight; and a pharmaceutical waste dumpsite off the Coast of Puerto Rico). However, EPA is currently considering relocation of sewage sludge dumping from its present nearshore (12-mile) location to Deepwater Dumpsite 106. And the Reagan Administration seems inclined to promote deepwater ocean dumping as an alternative to termination of ocean disposal for wastes previously considered too harmful to be dumped at sea. So, it is especially important that a valid basis be

developed for appropriately comparing nearshore and deep ocean options. The table below lists a number of relevant factors (extracted from my testimony at the EPA Public Hearing at Toms River, New Jersey, May 31-June 1, 1977):

Arguments in Support of Relocation to a Deep Ocean Site	Arguments Against Relocation to a Deep Ocean Site
1. Greater productivity and density of marine life on the shelf.	1. Impaired biodegradation of organic matter; greater sensitivity of deep-sea marine organisms; greater foraging (and bioconcentration) ability of deep-sea organisms.
2. Will permit restoration of commercial shellfishing at sites closed by FDA; will reduce human health impacts associated with shellfish contamination; will help avoid future fishkills and beach closings.	2. Will increase the likelihood of undesirable and hazardous "short dumping"; will preclude monitoring and corrective measures.
3. Will increase the cost of ocean dumping and provide dumpers the incentive to expedite land-based alternatives.	3. Will promote an out-of-sight, out-of-mind philosophy about ocean dumping and further reduce political resistance to continued ocean dumping.

In short, the Federal ocean pollution research program is as relevant and timely as ever in relation to ocean dumping. Indeed, given impending regulatory changes which seek to downplay preventive measures and to place much greater reliance on after-the-fact monitoring, the need for adequate research and monitoring support is especially acute. The large budget cuts in these areas proposed in the Administration's FY '83 budget are, in our view, unjustified and indefensible.

I will now very quickly address the remaining issue areas identified in the Chairman's invitation letter.

1. State-of-the-art, needs, and opportunities in ocean pollution research. Most of the research needs which I cited in my 1975 testimony--based on recommendations by various National Academy of Sciences and International Decade of Ocean Exploration (IDOE) panels--remain unmet. (1975 Hearings, pp. 47-50). Despite assertions by the National Advisory Committee on Oceans and the Atmosphere (NACOA) that major gains have been made in ocean pollution research over the last decade, I believe the conclusion of the Council on Environmental Quality in its 1970 report to the President (Ocean Dumping: A National Policy, p. 18) remains valid:

> Knowledge of ocean pollution is rudimentary, and generally it has not been possible to separate the effects of ocean dumping from the broader issue of ocean pollution. Yet one general conclusion is apparent: There is reason for significant concern. Dealing with ocean pollution requires that all sources be greatly reduced. If no action is taken and ocean dumping continues to increase, the long-term damage to the marine environment will be great.

2. Role of Federal and state governments and industry in sponsoring ocean pollution research. I have not been able to pull together specific facts and figures on this issue. However, my strong impression is that, apart from research and monitoring carried out by private industry in connection with applications for permits, licenses, and leases of various kinds, relatively little ocean pollution research is carried out by this sector. State and local government involvement in such research is again, I believe, predominantly oriented toward support of regulatory and other programs for which these governmental authorities have direct responsibility. Major research efforts, such as that exemplified by the Southern California Coastal Water Research Project (SCCWRP), which is funded primarily by the participating sewage authorities, are few

and far between. Clearly, the great bulk of the limited systematic ocean pollution research conducted in this country has been carried out by Federal government scientists or with Federal funds.

3. Quality of government research in ocean pollution. Although not universally true for all Federal agencies engaged in such research, I think NOAA scientists (particualrly those associated with the agency's Environmental Research Laboratories around the country) are generally of high-caliber and have carried out well-regarded, high-quality research. While NOAA research activities can be legitimately criticized for not always being as relevant as they should to the solution of real-world problems, a reorientation of this research, rather than a massive budget cut, would have been the appropriate way to resolve this problem.

4. Enhancement of our ability to make crossmedia assessments of waste disposal impacts. I've already alluded to the need to focus initial cross-media assessments on environmental impacts, and to the importance of recognizing the ocean's special status as an especially vulnerable "common resource." It is, therefore, critical that, in our zeal to treat all potential waste disposal media the same, we do not in fact doom the marine environment to treatment as a disposal option of first resort. (Since, unlike land and the atmosphere, the ocean is a "free" disposal medium, and it is not necessary to spend time and resources to reimburse displaced residents and businesses, or to purchase a disposal site, coastal waste generators will almost invariably prefer to ocean-dump unless Federal law intervenes to ensure that only "appropriate" wastes are dumped under suitable conditions and restrictions). One possible cross-media ranking scheme--for sewage sludge--is presented in EXHIBIT 5.

5. Effectiveness of the National Ocean Pollution Planning Act in coordinating ocean pollution research and monitoring. The National Ocean Pollution Planning Act has tremendous potential as a planning and coordinating tool. To date, only one final plan has been issued under the Act. As might be expected for such an initial effort, the first plan did little more than catalogue existing ocean pollution research and monitoring programs and expenditures. The second plan, although it has been circulating in draft form for several months, has not yet (to my knowledge) been released in final form--presumably to provide the Administration the opportunity to reconcile the final report with its FY '83 budget recommendations (if this is indeed the case, it represents an unfortunate perversion of the commendable goals of the National Ocean Pollution Planning Act). The draft I saw of the second plan (several months ago) seemed to do a much better job than the first plan of prioritizing research and monitoring needs. One shortcoming as I recall was the draft's emphasis on retrospective (after-the-fact) monitoring and the relatively little attention given to pre-disposal screening criteria or to providing a better basis for comparing laboratory and field measurements. The draft left much to be desired as well in the areas of long-range planning and out-year budget forecasts (which OMB, presumably, seeks to reserve as its exclusive prerogative). On the whole, however, and despite deficiencies in the first two plans issued under the new Act, the limited time and effort expended in compiling the plans seems abundantly justified in light of the great potential which the Act embodies for improved coordination and planning of ocean pollution research and monitoring.

I greatly appreciate the opportunity to appear before this subcommittee to present the views of the National Wildlife Federation on the important issues of "Ocean Dumping and Ocean Pollution Research".

EXHIBIT 1

DREDGE SPOIL OCEAN DUMPING: PERSPECTIVES ON LEGAL AND ENVIRONMENTAL IMPACTS

(Selected Excerpts)

BY Kenneth S. Kamlet, ~~Assistant~~ Director, ~~for~~ Pollution & Toxic Substances Division
National Wildlife Federation, Washington, D.C.

ABSTRACT

1. INTRODUCTION

2. SCOPE OF DREDGED MATERIAL OCEAN DUMPING

3. ENVIRONMENTAL SIGNIFICANCE OF DREDGED MATERIAL OCEAN DUMPING

4. FEDERAL OCEAN DUMPING REGULATION

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        4.3a. Rationale for bioassay tests

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6. THE "WAIVER" ISSUE

7. BIOASSAY TESTING ISSUES

    7.1. "Pooling" and Averaging of Bioassay Results

    7.2. Ten Percent Factor

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        7.4a. Number and distribution of necessary sediment samples

        7.4b. Selection of reference and control areas

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8. BIOACCUMULATION TESTING ISSUES

  8.1. The "Interim Guidance Matrix" for PCBs

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9. ALTERNATIVES TO OCEAN DUMPING

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  9.2. Feasible Containment Approaches in New York Harbor Area

  9.3. The New York District's "Incremental Implementation Plan"

10. CONCLUSION

7. BIOASSAY TESTING ISSUES

The purpose of bioassays in the ocean dumping context is to assess whether sensitive species in the vicinity of a dumpsite will be killed or injured by a given dredged material. In recognition of this, the Ocean Dumping Criteria require the use of both "appropriate sensitive" organisms and at least three different sensitive species.

Sensitive species must be tested in the laboratory if protection is to be assured to sensitive species in the field.

Multiple species must be tested in the laboratory to decrease the possibility that a particular test species will be insensitive to dredged material contaminants which could be highly toxic to other species in the environment which happen to be more sensitive to those (usually unidentified) contaminants.

7.1. "Pooling" and Averaging of Bioassay Results

A number of Corps of Engineer District Offices, notably the New York District, have adopted the position that solid-phase bioassay requirements will be regarded as having been violated only where the pooled mortality results for all three test species are statistically significant. A statistically significant mortality in one species alone will not require denial of permission to ocean-dump.

This position has been widely criticized (e.g., by EPA, the U.S. Fish & Wildlife Service, and the National Oceanic and Atmospheric Administration) on the basis that it ensures, at best, the protection of marine species in the field only of average or below average senstivity to dredged material contaminants. Organisms with above average sensitivities will not be protected by a bioassay procedure which relies on average mortality results. This concern is heightened by the fact that highly sensitive species can usually not be cultured and tested in the laboratory in any event--so that the sensitive" species tested in the first place are likely to be of sub-maximal sensitivity. The pooling approach simply compounds the problem of safeguarding truly sensitive species in the environment.

7.2 Ten Percent Factor

Related to the pooling issue is another issue of interpretation of bioassay results. The Corps of Engineers points to the fact that "a statistically significant effect in a bioassay does not necessarily imply that an ecologically important impact would occur in the field." Consequently, despite the Implementation Manual's caution that, in the face of such uncertainty, environmental protection necessitates treating any statistically significant increase in mortality compared to the controls as potentially undesirable and as indicating a potential for environmental impact, the Corps has taken the position that only statistically significant differences which also exceed 10% in absolute magnitude (e.g., 15 percent mortality in test animals versus 4 percent in controls) will be regarded as environmentally significant and as requiring permit denial. The only justification given for use of the 10 percent factor is the cryptic and unsubstantiated statement in the Implementation Manual that "there is a general feeling among many scientists that differences between control and treatment survival of 10 percent are necessary in most cases before predictions of probable impact can be made." Not only is this 10 percent factor difficult to justify, but it can be argued that a safety factor, in the opposite direction, would be needed to assure adequate protection to marine organisms from the chronic effects of sustained exposure to persistent toxic chemicals.

As a legal matter, the Ocean Dumping Criteria specify that solid-phase bioassays must not indicate occurrence of "significant mortality" based on considerations of statistical significance of effects at the 95 percent confidence level. Nowhere is authorization given to base determinations of ocean dumping acceptability on factors other than statistical significance.

A number of projects within the New York District of the Corps, as well as elsewhere in the country, were able to be authorized for ocean dumping solely because of Corps interpretations allowing pooling of solid-phase bioassay results and use of a ten percent "fudge" factor.

7.3 NWF v. Benn Lawsuit

A National Wildlife Federation lawsuit, brought against the New York District of the Corps in 1978, challenge (among other things) the Corps' approach toward interpreting bioassay test results. A decision was finally announced on June 12, 1980.

On the bioassay issues, the Court declined to "thrash through this thicket of scientific debate," being confronted with "well qualified scientists" supporting NWF's position, and "other scientists" supporting the Corps' position. Instead, the Court fell back on the judicial maxim that an agency's interpretation of administratiave regulations "becomes of controlling weight unless it is plainly erroneous or inconsistent with the regulation." Applying this standard, the Court was unwilling to conclude that the Corps' conduct was "arbitrary" or " contrary to regulatory requirements."

This illustrates, perhaps, how ill-equipped the judicial process is to resolve scientific disputes. If you couple this fact with the reluctance of most scientists to become embroiled in controversies in the public policy arena, it would seem that public interest advocates who cannot persuade a decision maker to correct an error voluntarily have only one other (peaceful) option: to take the issue to the public, the press, and the politicians. While this approach has been used to good effect by Rachel Carson and Jacques Cousteau, it tends to sensationalize the issues and lower the level of scientific debate, scientists seem to view those who practice this approach with a mixture of pity and contempt. Still, a scientist who is unwilling to contribute his expertise to ensure that important public policy issues are decided on the basis of the best available science, cannot appropriately object to the use of other methods.

The NWF lawsuit against the New York District of the Corps, although a disappointment on the bioassay issues, did produce important gains in six other areas:

1) A requirement that ocean disposal of maintenance dredged material may be authorized for no more than three years at a time; that reauthorization decisions must be preceeded by new environmental evaluations, notice to the public, and adherence to other applicable procedures; that project evaluation documents must include an analysis of "feasible alternatives to ocean dumping considered by the [permit] applicant or by the Corps of Engineers"; and that dredging sites must be "monitored from time to time" during the life of each ocean dumping authorization to determine whether "changes in conditions" have occurred.

2) A requirement that New York District ocean dumping public notices must include such information as need for and alternatives to ocean dumping; what has been done to assess bioaccumulation potential, sublethal effects, and applicable marine water quality criteria; and information concerning the performance of applicable bioassay tests, with test results portrayed individually for each series of tests and for each test species.

3) A requirement that bioaccumulation analyses must be conducted on test organisms surviving the 10-day solid-phase bioassay as a prerequisite to ocean dumping. These analyses must be performed for mercury, cadmium, PCB's, DDT, and petroleum hydrocarbons, and are to use Palaemonetes (shrimp), Mercenaria (clam), and Nereis (worm) as test species.

4) A requirement that liquid-phase chemical analyses must be performed for mercury, cadmium, PCB's, DDT, and other chemical contaminants if the permit applicant "has knowledge of nearby sources of contamination which may be affecting the sediments to be dredged." These results are then used by EPA to determine compliance with applicable marine water quality criteria.

5) A requirement that any sublethal effects which occur during the 10-day solid-phase bioassay (e.g., formation of tubes or burrows and any physical or

behavioral abnormalities) must be recorded on a daily basis and reported by the permit applicant.

6) A requirement that the Corps prepare a "full-scale, comprehensive EIS [Environmental Impact Statement]" covering the "extensive" ocean dumping of dredged material that occurs at the Mud Dump Site. Such an EIS, which will address the cumulative impacts of and overall availability of alternatives to the longstanding dredged material ocean dumping that has occurred at the Mud Dump Site, is now underway.

7.4. Other Bioassay Issues

Other issues related to bioassay testing have surfaced periodically and are likely to become increasingly important in the future. Among thses are the following:

7.4a. Number and distribution of necessary sediment samples

The Implementation Manual specifies that "sediment should be collected from a minimum of three sampling stations within the dredging area" and that the "sampling stations should be located throughout the area to be dredged and should be selected to characterize obviously contaminated as well as uncontaminated areas..." The Manual also points out that the larger the proposed dredging site, the more samples will be required for adequate coverage and characterization. As is apparent from the previous discussion of the Calcasieu project, in which only 3 sediment samples were taken and tested along a more than 33 kilometer-long channel, there could be considerable debate over what constitutes adequate sampling in specific cases. And, although individual samples should obviously be separately bioassayed, there are undoubtedly numerous instances in which multiple samples are pooled and tested only once. Public notices issued by the New York District of the Corps, for example, seldom present more than one set of bioassay test data for a given dredging and ocean dumping project.

Not only do unsystematic sampling and inappropriate blending of clean and dirty sediments pose the risk that bioassays will understate the potential harm to the environment, but such practices serve to inhibit efficient sediment management. If, for example, only 10 percent of all of the dredged material from a given area is sufficiently contaminated to violate the Ocean Dumping Criteria, does it make sense to dispose of 100 percent of the material at scarce upland sites, because the sediments were not fully characterized?

7.4b. Selection of reference and control areas

The Implementation Manual specified that field-caught test species and the reference sediment must be obtained from an uncontaminated area in the vicinity of the disposal site. Similarly, the Manual states, for purposes of field assessment of bioaccumulation, that "at least three stations...must be located in an uncontaminated sediment sedimentologically similar to that within the [dump] site, but in a direction opposite that of the net bottom transport." In practice, however, many Corps Districts utilize "reference" sediments and organisms which, although collected outside the dumpsite boundaries, cannot in any sense be regarded as "uncontaminated" because of multiple polluting activities in the vicinity. A good case in point is the New York Bight. A bioaccumulation study recently commissioned by the New York District of the Corps (O'Brien & Gere Engineers, Inc., 1979) utilized as reference sites a location in Lower New York Harbor--known to be heavily impacted by contamination from the Hudson River, ship traffic and associated discharges and spills, sewage effluent, and other urban discharges--and a nearshore site located between the New Jersey coast and the Mud Dump Site--known and expected to be subject to multiple sources of pollution. A "control" site was also chosen, in Long Island Sound. However, lobsters collected at this site were found to contain a mean PCB concentration of 78 ppb. Moreover, PCB levels in these lobsters showed a statistically significant correlation with lobster weight

7.4c. Use of flow-through versus static bioassays

EPA's "Bioassay Procedures for the Ocean Disposal Permit Program," which are limited to non-dredged wastes, states (EPA, 1976) that:

> Continuous-flow (often referred to as 'flow-through') bioassays have definite advantages over static tests in evaluating certain types of wastes to be disposed of at sea. They are desirable in testing waste chemicals that have high biochemical oxygen demands, and are unstable or volatile. Many test species of fish and macroinvertebrates have high rates of metabolism and are difficult to maintain in jars or tanks of standing sea water. Continuous-flow bioassays, conducted under proper conditions, provide for well-oxygenated test solutions, nonfluctuating concentrations of the toxicant, and continual removal of metabolic wastes of the test organisms. (Standard Methods, 13th Ed., 1971).

The current edition of Standard Methods (14th Ed., 1979) defines static bioassays as those in which the test organisms remain in the same test concentration for the and size, which suggests bioaccumulation. One may therefore question the choice of the Long Island Sound site as a reliable control.

This discussion serves only to highlight the significance of careful selection of reference and control sites in bioassay and bioaccumulation testing. On the one hand, use of a contaminated sediment as a "reference" might be defended on the basis that dredged material dumping should not be held responsible for pollution effects in the dumpsite vicinity unrelated to dredge disposal. On the other hand, however, marine organisms in and around the dumpsite will be harmed or contaminated as a result of the combined inputs of contaminants from dredge spoil ocean dumping and from all other nearby sources. If the addition of dredge spoil contaminants marks the difference between stressed but healthy organisms and organisms with eroding shells, rotting fins, and impaired reproduction (none of which are tested for under the Criteria), should the environmental acceptability of dredged material ocean dumping be judged solely on the basis of incremental contaminant additions or the more limited effects which would occur were high background levels of contamination not already present?

duration of the test, and flow-through tests as ones in which "measured quantities of dilution water and the stock toxicant solution are mixed and delivered periodically to the test chambers to give a continuous flow-through of the test toxicants" (Amer. Pub. Health Ass'n., 1979).

Unfortunately, the Implementation Manual indicates quite a different flow-through bioassay system. The Manual calls for the initial addition of dredged material at the beginning of the solid-phase bioassay, with a continuous flow of clean seawater through the system for the ten days of the test period "at a rate that will replace the aquarium volume at least once every 4 hr." No provision is made for the periodic readdition of dredged material--despite the fact that under actual ocean dumping conditions, several dumps frequently occur within a given ten-day period. Indeed, the Mud Dump Site in the New York Bight may receive 30 or more dumps within this time period. Although few solid-phase bioassays are currently carried out on dredged material under flow-through conditions, it is likely that the flow-through approach will be used increasingly as the frequency of failure of static tests increases. The concern, of course, is that "flow-through" tests under the conditions described in the Implementation Manual may greatly understate (particularly at heavily utilized dumpsites) the potential adverse impacts of ocean dumpling, because the opportunity exists to wash away the contaminants.

7.4d. Use of field versus laboratory assessments of bioaccumulation

The Implementation Manual notes that primary attention in connection with bioaccumulation of dredged material contaminants is usually given to the solid phase that is deposited on the bottom, since concern is focused on the possibility of gradual uptake over long exposure times. For this reason the Manual indicates that bioaccumulation from the solid phase is best evaluated in the field where possible. Several cautions are stated, however, with respect to reliance on field assessments of bioaccumulation. First, such an approach is permissible only when a historical precedent exists for the proposed operation. That is, it can be used only in the case of maintenance dredging and where the quality of the sediment to be dredged is considered not to have deteriorated or become more contaminated since the last dredging and disposal operation. Also, the disposal must be proposed for the site at which the dredged material in question has been previously disposed or for a site of similar sediment type supporting a similar biological community. Second, the species selected for analysis must occur in sufficient etc. There is a risk that inappropriate species will be selected.

A further difficulty is created by the fact that "true historic precedent" is a very fuzzy concept. For example, is a field assessment of bioaccumulation in fact justified at a heavily utilized dumpsite where, although a precedent exists for the ocean dumping of a particular bottom sediment of concern, the last time dredged material from that area was dumped was three years earlier? While that sediment may be no more contaminated now than it was three years ago, a lot of other dumping has intervened and obscured the effects of that dumping during that three-year period. Is it fair (or protective of the environment) to judge the bioaccumulation potential of dredged material X on the basis of field studies conducted three years after the last dump of similar material, where more recently dumped dredged materials A through W are probably having a much greater bearing on the results of the field studies? Unless field studies are performed immediately following the dumping of a particular dredged material of concern (and before other kinds of dredged material can be dumped on top), the most one can hope to measure is a random or average effect associated with ocean dumping from a large area over a long period of time. This again inhibits rational and efficient sediment numbers for collection of an adequate sample at all stations. And third, highly mobile epifauna (such as crabs, lobsters, shrimp, and fish) should not be used, since their location when collected cannot be related to their body burden at the time of collection in any potential cause-and effect manner. The most desirable organisms are relatively immobile species that are fairly large, such as bivalves, some gastropods, large polychaetes, etc. The Manual states that laboratory bioaccumulation tests should be employed only in those cases where a true historical precedent for the proposed operation does not exist.

One problem has been that Corps districts are doing field assessments of bioaccumulation without adhering to the restrictions specified in the Implementation Manual. For example, the two field assessments completed to date under sponsorship of the New York District of the Corps utilized only the very "highly mobile" epifaunal species (fish and crabs in one case; lobster in the other) that the Manual says should not be used. (Lee and Jones, 1977; O'Brien & Gere Engineers, Inc., 1979). Another is that the Manual provides no real quidance as to the selection of appropriate bioaccumulator species. The organisms should be large and non-mobile. But no preference is expressed for burrowers, deposit feeders, filter feeders, laboratory conditions. (Table 2). For the five projects public-noticed prior to September 1979, the Region II office of EPA formally concluded that "the material proposed for ocean dumping... is not in compliance with the Criteria" and EPA therefore objected to "any determination that the material proposed for ocean dumping [in connection with these projects] complies with the Ocean Dumping Criteria."

A key factor in this EPA position was the level of PCB accumulation in the polychaete worms tested because "polychaete worms are known to play a significant role in human food webs" and it was felt that "a potential health hazard" might be posed by allowing the dredged material to be ocean-dumped in proximity to commercially and recreationally important fisheries.

In fact, measured levels of PCB uptake in the worms were well within an order of magnitude of levels which, if they occurred in fish, would have rendered them unsafe for human consumption (based on the Food and Drug Administration action level of 5 ppm, which the FDA has indicated it will lower to 2 ppm). It does not seem unreasonable to be concerned--based even on the normal variability among species in PCB-scavenging lipids--that fish that regularly consume worms contaminated with 0.3 ppm of PCB might themselves accumulate levels ten-fold or more higher in their own tissues.

management by obscuring the differing properties and risks associated with contaminated and clean dredged materials. The Implementation Manual is, unfortunately, silent as to whether and under what circumstances field assessments are appropriate at heavily utilized dumpsites receiving diverse dredged materials.

It is suggested that, for dumpsites used by a multiplicity of dumpers or where long intervals separate successive dumping events, individual laboratory assessments of bioaccumulation potential may be far more probative and appropriate than field assessments. Field tests would be appropriate as part of the permit review process only for heavily utilized dumpsites which receive only one type of dredged material over a given, lengthy block of time. Such tests would also have value as an aid to dumpsite management by assisting site managers in evaluating the cumulative uptake and impact of contaminants at continuous use sites.

8. BIOACCUMULATION TESTING ISSUES

During the period July 24, 1979 through January 24, 1980, nine public notices were issued by the New York District of the Corps for projects whose dredged material showed statistically significant elevated levels of PCBs in the tissues of one or more test species under

Port 5/ Authority -Port Newark (NJ)	Newark Bay	10061 (9-26-79)	76,400	0.30 (worm)
Port Authority -Pass.Term (NY) 6/	Hudson R.	10062 (9-26-79)	230,000	0.32 (worm)
Paktank Atlantic Co.	Arthur Kill	10084 (1-3-80)	13,750	0.20 (shrimp) 0.17 (worm) 0.16 (clam)
Jackson 7/ Engr. Co. (NY)	Kill Van Kull	10098 (1-24-80)	91,700	0.19 (worm)

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*/ Only levels exceeding control values to a statistically significant degree are provided.

1/ Permit No. 11323, issued 3/11/80

2/ Permit No. 9590, issued 5/29/80

3/ Permit No. 9104, issued 12/22/79.

4/ Permit No. 9244, issued 4/21/80

5/ Permit No. 9232, issued 4/10/80

6/ Permit No. 9372, issued 3/6/80

7/ Permit No. 11392, issued 5/6/80

TABLE 2 York District Projects With Dredged Material Showing Significant PCB Bioaccumulation

Applicant	Waterway to be Dredged	Public Notice No. & Date	Quantity of Dredged Material (cu. meters)	PCB Level (ppm) in Test Organisms*
US Gypsum Co. (NY) 1/	Hudson R.	9919 (7-24-79)	76,400	0.29 (worm)
US Navy -- Earle (NJ)	Sandy Hook Bay	9929 (8-6-79)	5,580,000	0.62 (worm)
Monsanto Co. (NJ) 2/	Passaic R.	9969 (8-29-79)	4,600	0.17 (worm)
Refined Syrups & Sugars (NY) 3/	Hudson R.	9970 (8-29-79)	30,600	0.20 (shrimp) 0.07 (worm)
Seatrain 4/ Realty Corp. (NJ)	Hudson R.	9971 (d-29-79)	80,200	0.34 (worm)

However, notwithstanding these concerns--and without the benefit of a formal section 103(d) waiver process--EPA's Acting Assistant Administrator for Water and Waste Management advised the Corps of Engineers on December 27, 1979 that EPA would "not object to the one-time authorization of the ocean disposal of the small volume of meterial associated with the present maintenance dredging operation by Refined Syrups and Sugars." This action was taken despite the lack of any determination that Region II had erred in concluding that the Criteria had been violated, and despite EPA's lack of legal authority to withdraw objections to ocean dumping for material that has been found to violate the Criteria.

This action was justified on the bases that: Refined Syrups had "demonstrated to the satisfaction of the New York District and the North Atlantic Division [of the Corps] that the company has no feasible alternative to ocean dumping this material at this time"; and unless severe shoaling at the company's dock were relieved by dredging, "operations at the plant will soon have to terminate," which would result in "severe economic hardship" for the company and its employees. The overriding of Criteria requirements on the basis of economic factors in this way, is an action expressly reserved under the MPRSA for the formal waiver process.

The Acting EPA Region II Regional Administrator put it this way in a January 11, 1980, memorandum to the Assistant Administrator for Water & Waste Management at EPA Headquarters:

> We are legally prevented by the Marine Protection, Research, and Sanctuaries Act from taking economic factors into account in our preliminary determination. We may consider economics only if the COE requests a waiver...

Although the December 27th EPA letter made clear its author's view that the Refined Syrups situation was "unique both in its urgency and the combination of factors...which led me to this determination" and that, "in making this decision, I have no intention of setting a precedent for future actions of this nature...," another ocean dumping applicant--U.S. Gypsum Company--quickly sought to take advantage of the Refined Syrups precedent.

The December 27th letter, and a follow-up letter on January 16, 1980 (relating to the U.S. Gypsum Co. request), called for the establishment of a "Task Force" to "evaluate the situation, prepare a list of options available and submit its recommendations." Specifically, the letters said that the Task Force should "address the nature and extent of the problem in New York Harbor, alternatives to open ocean disposal such as land fill or capping with clean material inside the harbor or in the ocean itself, and make recommendations for a technically and economically feasible solution which will be consistent with domestic law and our international obligations." Recommendations were sought which would "provide an early solution to the U.S. Gypsum problem as well as a long range approach for coping with similar problems in the New York Harbor area."

Such a Task Force was, in fact, convened, with one subgroup (chaired by the New York District of the Corps) addressing short-term alternatives and another (nominally chaired by EPA addressing alternative ways of interpreting the results of bioaccumulation tests carried out on New York Harbor dredged material.

The alternatives subgroup considered only short-term "solutions": (1) a harbor-wide waiver of the Ocean Dumping Criteria (illegal because Convention prohibitions cannot be waived); (2) capping at the Mud Dump Site (technically unproven and probably illegal because material which violates the Criteria cannot be ocean-dumped, regardless of any subsequent handling of the material); (3) reevaluation of the techniques used to interpret Criteria requirements (addressed by the other subgroup and the option ultimately adopted); (4) capping in subaqueous borrow pits in New York Harbor (not subject to ocean dumping jurisdiction); and (5) continuation of permit processing, with grant of waivers, if necessary, on a case-by-case basis (illegal because Convention prohibitions cannot be waived).

The alternatives subgroup seemed to favor alternative (2)-- capping at the Mud Dump Site--but the U.S. Fish and Wildlife Service objected to the proposed capping plan unless it could be demonstrated to their satisfaction that the proposed cap would be stable. The subgroup's conclusion as reported in late February 1980 was that "there is no immediately available alternative for the disposal of dredged material that is determined to be in non-compliance with EPA Ocean Dumping Criteria."

8.1. The "Interim Guidance Matrix" for PCB's

The other subgroup--the Working Group on the Development of an "Interim Guidance Matrix"--forwarded its recommendations to Washington in early March. The matrix recommended can be summarized as follows:

--If the material proposed for ocean dumping shows statistically significant increases in PCB levels in all three test species--worm, clam, and shrimp--regardless of the magnitude of the uptake, the material is not in compliance with the Criteria and may not be ocean-dumped.

In view of the overriding regulatory significance being attached to the Interim Guidance Matrix, a brief discussion of the derivation of the matrix numbers is in order. The 0.1 ppm limit for PCBs in shrimp and clams was based on "the most conservative value recommended for PCB levels in fish" by the American Fisheries Society ("AFS"). The AFS recommendations (Veith et al., 1979) were based on the deliberations of a panel of scientists and were designed to protect fish-eating mammals and birds.

The 0.4 ppm limit for PCBs in worms was based on an entirely different rationale. This number is said to be "based on levels of PCB in the water column [of the New York Bight] and the potential for bioconcentration that can be expected in the Bight." The Working Group chose a bioconcentration factor for New York Bight sand worms of 10,000, based upon the known range of 1,350X to 230,000X for PCB bioconcentration among other marine species. No empirical data for sand worms of other polychaetes were employed in making this choice, so the factor chosen may or may not be appropriate.

A more serious shortcoming, however, than the choice of a possibly erroneous bioconcentration factor is the fact that the framers of the matrix assumed that all PCB bioconcentration in polychaetes comes from the water and that direct uptake from contaminated sediments in

--If the material proposed for ocean dumping shows statistically significant increases in at most two test species, the materials may be ocean-dumped when PCB bioaccumulation levels do not exceed 0.4 ppm in the worm, or 0.1 in the clam or shrimp.

--If statistical significance is shown in at most two of the test species, and the magnitude of the uptake exceeds the matrix value, the material has the potential for being capped. This determination will be made on a case-by-case basis.

Based on this matrix, the U.S. Gypsum Co. project and one of two Port Authority Projects (No. 10062) were cleared by EPA for ocean dumping on March 4, 1980. Four additional projects--Monsanto Co., Seatrain Realty Corp., Port Authority of NY & NJ, and Jackson Engineering Co.--were cleared by EPA on March 21, 1980. Of the original 9 publicly noticed projects (Table 2), only two--U.S. Navy and Paktank Atlantic Co.--remained in violation of the Interim Guidance Matrix and had not been authorized for ocean dumping as of mid-May, 1981. Although EPA conditioned its approval for the first two of these projects on follow-up capping, no such capping requirement was imposed for the second group of four projects.

insignificant and can be disregarded. This is clearly not the case. For example, Fowler et al. (1978) found that 85 percent of the PCB body burden in sand worms (Nereis diversicolor) in both coastal and oceanic habitats could be accounted for by uptake from sediment. Although the PCB concentration factor was much higher in water (800X) than sediment (3.5X), when Fowler et al. (1978) multiplied these factors by ambient sediment and water concentrations, the dominance of the sediment input became evident. Courtney and Langston (1978) and Elder et al. (1979) provide similar information on PCB uptake from sediment. Consequently, to the extent the interim guidance matrix purports to safeguard health and the environment by preventing increased bioconcentration from water--but not sediments--it may be seriously understating the potential for significant bioaccumulation.

The other basic underpinning of the matrix number for PCBs in worms is the assumption that 44 ng/l is representative of present PCB water column levels in the New York Bight. The limited field data available suggest a range of PCB concentrations in the Bight between 10 and 55 ng/l. However, measurements within the Mud Dump Site have been on the low end of this scale. Since the matrix value of 0.4 ppm (as the body burden worms and other species in the Bight can be expected to bioconcentrate directly from the water column) is derived by multiplying a water concentration of 44 parts per trillion by a bioconcentration factor of 10,000) and then rounding off to the nearest tenth of a ppm), any significant overestimate in either number could result in an excessive and insufficiently protective matrix value. For example, if one used a bioconcentration factor (from water) for the sand worm of 800X rather than 10,000X, one would obtain a matrix value of 12.5X smaller (i.e., 0.032 ppm). Similarly, if one used an existing water column concentration for PCBs at the dumpsite of 10 ppt rather than 44 ppt, one would obtain a matrix vlaue more than 4X smaller (i.e., 0.1 ppm). If one did either, none of the six projects thus far approved under the matrix would have satisfied the matrix.

The biggest problem with the matrix approach, however, is the philosophical and legal assumptions which underlie it. The Working Group has made clear that the matrix value recommended for the sand worm represents a level of PCB bioaccumulation at the Mud Dump Site regarded as "acceptable" based solely on the principle of "no further degradation at the Site." (Emphasis added.)

The premise that ocean dumping can be approved as long as it does not result in incremental environmental degradation is highly questionable conceptually and reflects the highest level of PCBs in marine waters consistent with assured safety to human health and fish-eating predators. If the Working Group applied its methodology to this "safe" level, rather than to a claimed existing level 44 times higher, the resulting matrix value for the worm would be 0.01 ppm. Even if a bioconcentration factor of 1,000 rather than 10,000 were used, the resulting matrix number would be 0.1 ppm--still too low for any of the nine publicly-noticed projects to meet. And such a level would still not have considered the significant potential for direct bioaccumulation into the tissues of worms in contact with contaminated bottom sediments. Lest one regard the 1.0 part-per-trillion marine water quality criterion for PCBs set by EPA as excessively stringent and unrealistic, it should be noted that a panel of scientists convened by the American Fisheries Society felt that such a criterion was not stringent enough to safeguard fish-eating predators and proposed an alternative level of 0.1 part-per-trillion (Veith et al., 1979).

8.2. Future Use of "Interim Guidance Matrices"

Other Corps of Engineer Districts--most of which have not yet begun to require bioaccumulation testing at all--are likely to be increasingly tempted to "solve" problems which they may encounter with dredged material scientifically. And is clearly impermissible legally. The Ocean Dumping Law makes it U.S. policy to prevent or strictly limit the ocean dumping of any material which would "adversely affect" health or the environment. It does not require strict control only of material which will cause further environmental degradation. To the same effect is the London Dumping Convention which pledges the parties to "promote the effective control of all sources of pollution of the marine environment" and to "take all practicable steps to prevent the pollution of the sea by [dumping]...that is liable to create hazards to human health, [etc.]." The goal is prevention of hazard-producing pollution; not merely avoidance of further degradation.

In the New York Bight, which is already severely degraded, and where ocean-dumped contaminants are already having a discernible deleterious effect on the marine ecosystem (and a possible impact on human seafood-eaters as well--if FDA safety limits are being exceeded), a regulatory strategy which is designed to perpetuate the present level of degradation would seem extremely difficult to reconcile with any common-sense notion of what regulators should be attempting to accomplish.

EPA has established a marine water quality criterion for PCBs of 1.0 part-per-trillion. (EPA, 1977.) This which fails to pass the Ocean Dumping Criteria, by developing "interim guidance matrices" of their own which will allow the material to "satisfy" the Criteria. Such an approach, of course, solves nothing as long as the underlying problem of inadquate management of contaminated dredge spoils remains unsolved.

EXHIBIT 2

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

RECEIVED
SEP 29 1980
NWF POLLUTION
& TOXIC SUBSTANCES

NATIONAL WILDLIFE FEDERATION,)
Plaintiff,)
v.)
DOUGLAS M. COSTLE, et al.,)
Defendants.)

CIVIL NO. 80-0405

FILED
SEP [illegible]
JAMES E. DAVEY, C[illegible]

STIPULATION OF SETTLEMENT AND DISMISSAL

The matters in controversy having been amicably agreed to by the plaintiff, National Wildlife Federation [hereinafter NWF] and by the defendants, Douglas M. Costle, Administrator, Environmental Protection Agency [hereinafter EPA], Clifford L. Alexander, Jr., Secretary of the Army, and John W. Morris, Chief of Engineers, United States Army Corps of Engineers [hereinafter Corps], it is hereby stipulated by plaintiff and defendants as follows:

WHEREAS, this action was filed by plaintiff on February 11, 1980, challenging the January 16, 1980, promulgation of regulations by the Administrator of EPA, designating 131 ocean dumpsites for interim use in ocean dumping pending completion of long term studies and final designation pursuant to the Marine Protection, Research and Sanctuaries Act, 33 U.S.C. 1401 et seq., 45 Fed. Reg. 3053 (January 16, 1980), and challenging the utilization of those interim dumpsites by both EPA and the Corps.

WHEREAS, in the above-captioned action NWF alleged that the designation of dumpsites for interim use by EPA violated the requirements of the Administrative Procedure Act, 5 U.S.C. 551 et seq., the National Environmental Policy Act, 42 U.S.C. 4331 et seq., and the Marine Protection, Research and Sanctuaries

Act, 33 U.S.C. 1401 et seq., and sought a declaratory judgment that the regulations as promulgated were in contravention of those Acts and in addition sought injunctive relief against both the EPA and the Corps;

WHEREAS, the parties hereto act in the understanding that the stipulation and dismissal will permit EPA to promulgate final regulations designating interim dumpsites consistent with the provisions set forth herein; and

WHEREAS, the parties desire to settle the instant action without admission of liability and without further litigation and the costs incident thereto, the plaintiff and defendants hereby agree as follows:

1. The Corps agrees to issue a guidance memorandum directed to each Corps District and Division Engineer specifying certain procedures to be followed in determining whether to issue an ocean dumping permit for disposal of dredged materials at interim designated dumpsites. A copy of that guidance memorandum is attached as Attachment A.

2. EPA agrees to promulgate final regulations designating interim dumpsites that delete from the list of interim sites those sites which are no longer in use and for which no future need is anticipated, and those sites which EPA, in consultation with the Corps of Engineers, determines are unsuitable for further ocean dumping.

3. EPA agrees to promulgate regulations which provide for completion of environmental impact statements and final designation or termination of specific dumpsites in accordance with the attached schedule. (Attachment B.).

4a. EPA agrees to send a letter substantially conforming to the letter attached as Attachment C to all coastal state and Federal fish and game agencies seeking information on the proximity of interim dumpsites to commercial and recreational fishery resources.

b. EPA agrees that the responses to this inquiry will be considered as part of the administrative record by EPA in assessing the suitability of dumpsites for final designation.

5. EPA and the Corps agree to undertake the actions stipulated to herein on an expeditious basis, with such actions completed no later than November 24, 1980.

6. NWF agrees to waive all other claims against EPA and the Corps arising from the January 16, 1980, Federal Register notice and arising from a final promulgation of the interim dumpsites in conformance with this stipulation, and the above-entitled action shall be dismissed on this basis.

Respectfully submitted,

Attorney for Defendants

JAMES W. MOORMAN
Assistant Attorney General
Department of Justice
10th & Pennsylvania Avenue, N.W.
Washington, D.C. 20530

Attorney for Plaintiff

Kenneth S. Kamlet
KENNETH S. KAMLET
National Wildlife Federation
1412 Sixteenth Street, N.W.
Washington, D.C. 20036

Approved:

Joyce Hens Green
September 25, 1980

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF COLUMBIA

NATIONAL WILDLIFE FEDERATION,
Plaintiff,

v.

DOUGLAS M. COSTLE, et al.,
Defendants.

CIVIL NO. 80-0405

FILED
SEP 25 [illegible]
JAMES E. DAVEY, Cle

CONSENT ORDER OF DISMISSAL

The matters in controversy having been amicably adjusted by the plaintiff and defendants according to a Stipulation of Settlement and Dismissal filed in this matter dated September 25, 1980, it is this 25th day of [illegible] 1980, hereby ORDERED

That this action be and hereby is dismissed as to defendants on the basis indicated.

Joyce Hens Green
UNITED STATES DISTRICT JUDGE

Entry of the above Order is hereby consented to:

Attorney for Defendants

JAMES W. MOORMAN
Assistant Attorney General
Department of Justice
10th & Pennsylvania Avenue, N.W.
Washington, D.C. 20530

Attorney for Plaintiff

Kenneth S Kamlet
KENNETH S. KAMLET
National Wildlife Federation
1412 Sixteenth Street, N.W.
Washington, D.C. 20036

TO: All District Engineers

FROM:

In determining whether to authorize ocean dumping at an interim-approved dumpsite, the District Engineer shall assess the reasonable availability of alternatives to dumping at an interim designated or partially studied ocean dumpsite. Specifically, the District Engineer shall consider: (a) the feasibility and practicability of using a finally designated ocean dumpsite or using a more fully studied ocean dumpsite in lieu of an unstudied dumpsite (e.g., do other ocean dumpsites exist within a reasonable transport distance of the dredging area? what is the status of final designation and study efforts for such site(s)?); (b) the feasibility and practicability of deferring the decision on ocean dumping at the proposed site until site study and/or final designation efforts have been completed (e.g., how urgent is the need for immediate dredging and disposal? how imminent are the completion of site study and/or designation efforts?); and (c) the availability of practicable alternative locations and methods of dispocal or recycling of the material proposed to be ocean-dumped, within the meaning of 40 C.F.R. §227.16.

Public notices announcing proposals to ocean-dump dredged material at interim-approved ocean dumpsites shall include the District's preliminary assessment of whether or not there are reasonably available alternatives to dumping at such a site, together with a short explanatory statement. This preliminary assessment is to be based on information available

Attachment A.

to the District Engineer at the time of the public notice, and is not intended to replace or duplicate the alternatives discussion in the environmental document prepared for the project or permit. Rather, the reason for including the assessment in the public notice is to generate more specific input for use in the alternatives discussion and in determining whether to authorize dumping at an interim-approved site.

As a matter of policy, undesignated ocean dumpsites (e.g., sites which are not either interim-approved or finally designated) will not under normal circumstances be used.

SCHEDULE FOR PUBLICATION OF EIS's AND PROMULGATION OF SITE DESIGNATIONS

Pursuant to Paragraph 3 of the Stipulation of Settlement and Dismissal, EPA will promulgate regulations which provide for the completion of EIS's and final designations of certain dumpsites or termination of those dumpsites in accordance with the following schedule.[1/]

Site	Draft EIS	Proposed Site Designation	Final EIS	Proposed Final Designation
106 Mile		10/24/80	2/27/80	5/29/81
Hawaii	10/20/79	10/20/80	9/30/80	1/30/81
Acid Waste	11/27/79	5/29/80	10/10/80	12/10/80
San Francisco	10/10/80	11/14/80	5/11/81	7/13/81
Galveston	12/10/80	12/29/80	7/81	9/81
New York Mud Dump	12/30/80	1/16/81	7/81	9/81
Vieques Pass	12/20/80	1/16/81	7/81	9/81
Columbia River	2/5/81	2/20/81	9/81	11/81
Portland	3/9/81	3/23/81	10/81	12/81
Sabine Neches	4/6/81	4/20/81	11/81	1/82
Jacksonville	5/6/81	5/22/81	12/81	2/82
Tampa	6/27/81	7/6/81	1/82	3/82
New York Cellar Dirt	7/20/81	8/3/81	2/82	4/82

1/ Each final EIS and final site designation will be promulgated approximately 6 months following the date of publication of the draft EIS and proposed site designation unless factors beyond the control of EPA compel a later date for promulgation. Factors which may delay publication of the final EIS and final site designation include but are not limited to litigation affecting the proposed site designation or EIS, the receipt of comments beyond the close of the comment period containing significant information which could not have been submitted earlier, or receipt of timely comments which require major revisions of the EIS or which necessitate additional studies and/or monitoring of the site.

ATTACHMENT B

Site	Draft EIS	Proposed Site Designation	Final EIS	Proposed Final Designation
Charleston, Savannah, Wilmington	8/10/81	8/24/81	3/82	5/82
Long Beach	10/19/81	11/2/81	5/82	7/82
New Jersey, Long Island	11/9/81	11/23/81	6/82	8/82
San Juan	12/14/81	12/28/81	7/82	9/82
Pennsacola, Mobile, Gulfport	1/6/82	1/20/82	8/82	10/82
San Diego	2/4/82	2/19/82	9/82	11/82
San Francisco 100 Fathom Site	4/5/82	4/19/82	11/82	1/83
Humbolt	5/5/82	5/19/82	12/82	2/83
Coos Bay	6/7/82	6/21/82	1/83	3/83

DRAFT LETTER RE INTERIM OCEAN DUMPSITES
TO FISH & GAME AGENCY REPRESENTATIVES

Dear [FISH AND GAME AGENCY REPRESENTATIVES]:

The Environmental Protection Agency seeks information for the purpose of evaluating the suitability for continuing use of the following interim ocean dumpsite[s] located in your geographic area:

> [[List site[s], giving latitude and longitude coordinates, and indicating approximate distance to the nearest land; a location map would also be useful].

Under the Marine Protection, Research, and Sanctuaries Act and the London Dumping Convention, EPA considers (among other factors) the effect of dumping on fisheries resources and wildlife; location of dumpsites in relation to spawning, nursery and fishing areas; and the probability that dumping will produce taints or other changes which may reduce the marketability of fish and shellfish resources in promulgating regulations designating ocean dumpsites.

Accordingly, we would appreciate any information you can supply, within 30 days of receipt of this letter, regarding the presence of spawning, nursery or fishing areas in proximity to the listed ocean dumpsite[s].

Sincerely,

Attachment C.

KK

(Sec. 110 of the Clean Air Act, as amended)

Dated: November 28, 1980.

Douglas M. Costle,

Administrator.

Subpart U—Maine

Title 40, Part 52 of the Code of Federal Regulations is amended as follows:

§ 52.1020 [Amended]

1. Section 52.1020(c)(11) is amend by striking the phrase "on May 1, 1 October 26, 1979, and December 20 1979", and substituting in place the the phrase "on May 1, 1979, October 26, 1979, December 20, 1979, and July 9, 1980."

§ 52.1027 [Amended]

2. Section 52.1027 is amended by removing paragraph (a)(1) and by redesignating paragraph (a)(2) as paragraph (a).

[FR Doc. 80-38077 Filed 12-8-80; 8:45 am]

BILLING CODE 6560-38-M

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40 CFR Part 120

[WH-FRL 1696-1]

Water Quality Standards; Navigable Waters of the Commonwealth of Kentucky

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: EPA withdraws a rule which amended the Commonwealth of Kentucky's water quality standards by establishing uses for waters left unclassified by Kentucky and by establishing bacterial limitations for the secondary contact recreation use designations. The Commonwealth of Kentucky has recently taken action to adopt standards that were essentially the same as those previously promulgated by EPA. This action will remove those previously imposed Federal Standards on Kentucky.

DATES: This rule is effective December 9, 1980.

ADDRESSES: Any questions or comments should be sent to Mr. R. F. McGhee, Water Quality Standards Coordinator, EPA Region IV, 345 Courtland Street, N.E., Atlanta, Georgia 30308.

FOR FURTHER INFORMATION CONTACT: Mr. R. F. McGhee, 404-881-4793 or Mr. Kent Ballentine, 202-245-3030.

SUPPLEMENTARY INFORMATION:

Background

On September 10, 1980, EPA published in the Federal Register (45 FR 59598) a proposed rule to withdraw a previous rulemaking promulgated for Kentucky. The earlier rule is presently codified in the Code of Federal Regulations at 40 CFR 120.27.

As explained in the proposed rulemaking, EPA approved revised Kentucky water quality standards on May 7, 1980 that satisfy the reasons for EPA's earlier promulgation. Following the rule withdrawal action today, the

EXHIBIT 3

[illegible] purpose of this rulemaking in its proposed rule which it hereby incorporates by reference. Very briefly states, the reasons for EPA's withdrawal action today are as follows: (1) EPA is withdrawing a requirement for specific EPA approval of Kentucky's variances of water quality criteria or uses because EPA's general water quality standards regulation (40 CFR 35.1550) already include this requirement, (2) EPA is withdrawing its designated uses for waters previously not classified by Kentucky because Kentucky's revised water quality standards classify all waters for all uses, and (3) EPA withdraws its fecal coliform bacterial limitations for secondary contact recreation because Kentucky's revised standards contain a requirement which appears to be at least as stringent as in the existing EPA rule. ✓

Because EPA's prior objections leading up to the promulgation have been satisfied, the rule is unnecessary and therefore withdrawn today.

Public Comments on the Proposed Rule

EPA did not receive any public comments during the 45-day comment period provided.

Justification for Making the Rule Effective Immediately

The Administrative Procedure Act (5 U.S.C. 553(d)) requires that 30 days notice be provided before a rule becomes effective unless an agency "for good cause found" decides otherwise. EPA believes that an immediate effect is justified in this case because the Agency is withdrawing a rule, and because the reason for that withdrawal is the existence of essentially equivalent State regulations. Therefore, no useful purpose would be served by maintaining the rule in effect for an additional 30 days.

Specialized Regulation

Under Executive Order 12044, EPA is required to judge whether a regulation is "significant" and therefore subject to the procedural requirements of the Order or whether it may follow other specialized development procedures. EPA labels these other regulations "specialized." I have reviewed this regulation and determined that it is a specialized regulation not subject to the procedural requirements of Executive Order 12044.

(Sec. 303 (33 U.S.C. 1313), Clean Water Act (Pub. L. 92-500, as amended (33 U.S.C. 1251 et seq.)))

ecember 3, 1980.

Costle,

ator.

120.27 of Part 120 of Chapter I, Title 40 of the Code of Federal Regulations is hereby repealed and henceforth will read as follows:

§ 120.27 Kentucky [Reserved]

[FR Doc. 80-38101 Filed 12-8-80; 8:45 am]

BILLING CODE 6560-29-M

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40 CFR Part 228

[WH-FRL 1695-1]

Ocean Dumping—Extension of Interim Site Designations

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: EPA today amends § 228.12 to extend the interim designation of some ocean dumping sites pending completion of Environmental Impact Statements and formal rulemaking procedures, cancel the designations of some sites, and extend other sites, mainly those for dredged material disposal, until the completion of site designation studies and formal designation. This action is necessary to assure that maintenance dredging of harbors and essential waste disposal into the oceans is continued until the necessary site designation studies are done. This action designates on an interim basis those ocean dumping sites necessary for the ocean disposal of wastes and of dredged material from maintenance dredging.

EFFECTIVE DATE: December 9, 1980.

FOR FURTHER INFORMATION CONTACT: Mr. T. A. Wastler, 202/472-2836.

SUPPLEMENTARY INFORMATION: EPA published revised Ocean Dumping Regulations and Criteria in the Federal Register on January 11, 1977 (42 FR 2462 et seq.). Section 228.12 contains a list of approved interim ocean dumping sites and states, in part:

> The following sites are approved for dumping the indicated materials on an interim basis pending completion of baseline or trend assessment surveys and designation for continuing use or termination of use.

The 1977 designations were effective for a maximum of three years. On January 16, 1980, EPA extended the interim designations until December 1982 or until site designation studies are completed. (45 FR 3053 et seq.) As EPA explained at that time, an extensive program of dumpsite surveys and Environmental Impact Statement (EIS) preparation has been underway since 1977 pursuant to Contract No. 68-01-4610 ("the Contract"). This program covers most of the significant interim-designated dumpsites, including all the sites needed after January 1980 for ocean disposal of sewage sludge or industrial wastes and those dredged material disposal sites which service existing navigation projects and which either routinely receive large quantities of dredged material or receive dredged material which may be contaminated.

1. The Contract, funded jointly by EPA and the Corps of Engineers (COE), will complete EIS's on three municipal and industrial sites and on 19 areas for the ocean dumping of dredged material encompassing 45 specific dredged material dumping sites. The schedule for availability of EIS's and designation of sites is as follows:

Site	Draft EIS	Proposed site designation	Final EIS	Final site designation
106 Mile	6/25/78	12/19/80	2/27/80	3/23/81
Hawaii	10/20/79	11/14/80	8/30/80	1/30/81
Acid Waste	11/27/79	5/29/80	12/1/80	2/1/81
San Francisco	11/30/80	12/18/80	6/30/81	8/30/81
Galveston	1/30/81	2/15/81	9/81	11/81
New York Mud Dump	4/1/81	4/16/81	11/81	1/82
Yaquina Pass	2/1/81	2/16/81	9/81	11/81
Columbia River	3/15/81	4/1/81	10/81	12/81
Portland, ME	5/15/81	6/1/81	12/81	2/82
Sabine, Neches	6/15/81	7/1/81	1/82	3/82
Jacksonville	6/15/81	7/1/81	1/82	3/82
Tampa	6/27/81	7/8/81	1/82	3/82
New York Cellar Dirt	8/15/81	9/1/81	3/82	5/82
Charleston, Savannah, Wilmington	8/10/81	8/24/81	3/82	5/82
Long Beach	10/19/81	11/2/81	5/82	7/82
New Jersey, Long Island	11/9/81	11/23/81	6/82	8/82
San Juan	12/14/81	12/28/81	7/82	9/82
Pensacola, Mobile, Gulfport	1/6/82	1/20/82	8/82	10/82
San Diego	2/4/82	2/18/82	9/82	11/82
San Francisco 100 Fathom Site	4/5/82	4/19/82	11/82	1/83
Humboldt	5/5/82	5/19/82	12/82	2/83
Coos Bay	6/7/82	6/21/82	1/83	3/83

The Final EIS date in the above schedule is provisional. EPA and the contractor will make best efforts to meet the final dates; however, it is recognized that factors beyond the control of EPA or the contractor may delay final publication. These factors include the number of comments received or the complexity of response. Accordingly, the final date cannot be regarded as a firm Agency commitment.

2. Other studies under the Contract are directed toward setting priorities for studies of other interim designated sites. In the course of these studies, sites for which there is no projected future need are also being identified. A report developed under the Contract is being used by EPA and COE to determine which sites may be terminated and to set priorities for future site designation studies. At this time one site is being cancelled based on the information presented in this report. This site is Site 1-A at Port Mansfield Channel, Texas. A further evaluation of these sites is now underway by EPA and COE, and we anticipate that additional sites will be cancelled within the next 90 days.

3. In addition, an environmental report is being prepared on the Philadelphia dumpsite under the Contract. This dumpsite will not be used after December 1980. The purpose of this report is to evaluate all the available data on the dumpsite in order to assess any damage caused by dumping of sewage sludge at this location and to provide "ground truth" for evaluation of laboratory test procedures. Because of the short time period this site will remain in use, it is not regarded as necessary to designate that site for continuing use, and an EIS on the site will not be prepared. This site will be retained as an interim site until December 31, 1980.

4. Several industries are currently using the Puerto Rico industrial waste disposal site while a suitable waste treatment plant is being constructed. This plant is scheduled for completion in September 1981. An EIS is not being prepared for this site, and the site will be abandoned as soon as the waste treatment plant is completed. This site will be retained as an interim site until plant completion.

5. A site in the New York Bight is currently being used for the incineration of wood. Incineration of wastes at sea is regulated under the Marine Protection, Research, and Sanctuaries Act. An EIS on the North Atlantic Incineration Site is being prepared under the Contract, and the Draft EIS is scheduled for completion in January 1981. A determination of the need for an EIS on the New York Bight incineration site will be held in obeyance until the EIS on the North Atlantic Incineration Site is completed.

6. Twenty-two dredged material dumpsites in the Louisiana area are not included in the present contractual effort. These were scheduled to be studied by NOAA, but the necessary budgetary support to do the studies was not obtained. Studies on the 22 Louisiana dredged material sites began under the Contract during 1980, and EIS's on these sites will be published during 1982.

7. The contractual study mentioned above, in addition to identifying sites for which no future use is projected, has also identified sites for which studies for designation are needed and indicated the types of information needed on those sites.

The dredged material sites for which EIS's are being prepared under this contract represent those sites which are most likely to receive contaminated dredged material. Because of the variety of environmental conditions represented by these sites, the studies on them will provide a solid base of factual information by which to determine what studies are needed on the remaining sites.

As each EIS for the locations presently under study is completed, the results will be used to help determine the nature and extent of the investigations necessary for evaluating similar sites which have not been included in the present EIS program. Based on this evaluation, the frequency of use of each site, and the probable significance of environmental effects from continued use of each site, studies necessary to evaluate the suitability of each site for use will be determined and initiated as soon as feasible.

The 19 dredged material locations for which EIS's are being prepared are all in regular use at present and account for 75 percent of the total dredged material presently ocean dumped. The Louisiana sites account for an additional 15 precent of the dredged material currently ocean dumped. The remaining interim designated sites, which receive

10 percent of the total dredged material ocean dumped, are used only intermittently and, judging from their locations and other information presently available, should receive only uncontaminated dredged material.

EPA will maintain continuing review of the status of studies of all interim-designated sites and will report on the project as appropriate in EPA's Annual Report to Congress on the Ocean Dumping Program.

Since the site designation studies have not been completed and it remains necessary to use these sites until the studies can be completed, EPA has determined that the interim site designations should be extended until these studies can be completed.

Note.—This action will have impacts only in the vicinity of the dump sites and to those who use them, and we have determined that this rule is not a "significant" regulatory action within the meaning of Executive Order 12044, Improving Government Regulations (March 23, 1978).

(33 U.S.C. 1412 and 1418)

Dated: November 28, 1980.

Eckardt C. Beck,

Assistant Administrator for Water and Waste Management.

In consideration of the foregoing, Subchapter H of Chapter I of Title 40 is amended by deleting the last sentence of § 228.12(a) and substituting the following language:

§228.12.

(a) * * * This list of interim sites will remain in force according to the following schedule:

(1) Until December 31, 1980:

(i) Region III municipal sewage sludge site (Philadelphia site).

(2) Until the waste treatment plant now under construction for the present industrial dumpers is completed:

(i) Region II industrial wastes site off Puerto Rico.

(3) Until such time as formal rulemaking is completed or until December 31, 1982, whichever is sooner, the following sites for dumping under EPA permits under Section 102 of the Act:

(i) Region II Acid Waste Site.

(ii) Region II Cellar Dirt Site.

(iii) Region II Industrial Waste Site (106-mile site).

(4) Until such time as formal rulemaking is completed or until February 1983, whichever is sooner, the following sites for disposal of dredged material under Corps of Engineers permits under Section 103 of the Act:

(i) Portland, ME.

(ii) New Jersey/Long Island Sites (8 sites):

Absecon Inlet; Cold Spring Inlet; Manasquan Inlet; East Rockaway; Jones Inlet; Fire Island; Shark River; and Rockaway Inlet.

(iii) Mud Dump.

(iv) San Juan Harbor.

(v) Charleston/Savannah/Wilmington (5 sites):

Wilmington Harbor; Morehead City Harbor; Georgetown Harbor; Charleston Harbor; and Savannah River.

(vi) Jacksonville Harbor.

(vii) Tampa Harbor (2 sites.)

(viii) Gulfport/Mobile/Pensacola (5 sites):

Mobile; Pascagoula; Gulfport (2 sites); and Pensacola.

(ix) Sabine-Neches (4 sites).

(x) Galveston Harbor and Channel.

(xi) Humboldt Bay.

(xii) Farallon Islands.

(xiii) San Francisco Channel Bar.

(xiv) Los Angeles.

(xv) San Diego (2 sites).

(xvi) Hawaii (3 sites):

Honolulu Harbor; Kauai—Nawiliwili; and Kauai—Hanapepe.

(xvii) Mouth of Columbia River (5 sites).

(xviii) Coos Bay Entrance (2 sites).

(5) The interim designations of the following sites are terminated effective immediately:

(i) Both Region I industrial waste sites.

(ii) Region II wreck site.

(iii) Region III acid wastes site.

(iv) Region IV industrial wastes site.

(v) The Region VI industrial waste site located at 28d 00′ to 28d 10′ N, and 89d 15′ to 89d 30′ W.

(vi) Port Mansfield Channel Disposal Area 1-A.

(6) The interim designations of all other dredged material sites listed in Section 228.12(a) and the Region II wood incineration site are extended indefinitely, pending completion of the present studies and determination of the need for continuing use of these sites, the completion of any necessary studies, and evaluation of their suitability. Designation studies for particular sites within this group will begin as soon as feasible after the completion of nearby sites presently being studied.

[FR Doc. 80-38035 Filed 12-8-80; 8:45 am]

BILLING CODE 6560-29-M

GENERAL SERVICES ADMINISTRATION

41 CFR Parts 5-9 and 5A-9

Patents, data, and Copyrights; Transfer Parts

AGENCY: General Services Administration.

ACTION: Final rule.

SUMMARY: The General Services Administration Procurement Regulations, Chapter 5, are amended to transfer policies and procedures regarding patents, data, and copyrights from Chapter 5A. This transfer is part of the action to incorporate appropriate material in Chapter 5A into Chapter 5. The intended effect is to have a single GSA-wide procurement regulation.

EFFECTIVE DATE: December 31, 1980.

FOR FURTHER INFORMATION CONTACT: Philip G. Read, Director, Federal Procurement Regulations Directorate, Office of Acquisition Policy (703-557-8947).

SUPPLEMENTARY INFORMATION:

CHAPTER 5—GENERAL SERVICES ADMINISTRATION PROCUREMENT REGULATIONS

[APD 2800.2 CHGE 8]

1. The Table of Parts is amended by adding the following entry:

Table of Parts

Part

5-9—Patents, Data, and Copyrights.

2. Part 5-9 is added as follows:

PART 5-9—PATENTS, DATA, AND COPYRIGHTS

Subpart 5-9.1—Patents

Sec.
5-9.100 Scope of subpart.
5-9.150 Patent indemnification of governme
by contractor.
5-9.151 Notice and assistance regarding patent infringement.

Subpart 5-9.50—Copyrights

5-9.5001 General.
5-9.5002 Use and publication by the government of copyrighted material.
5-9.5003 Contracts for use of copyrightable material.
5-9.5004 Copyright clause.

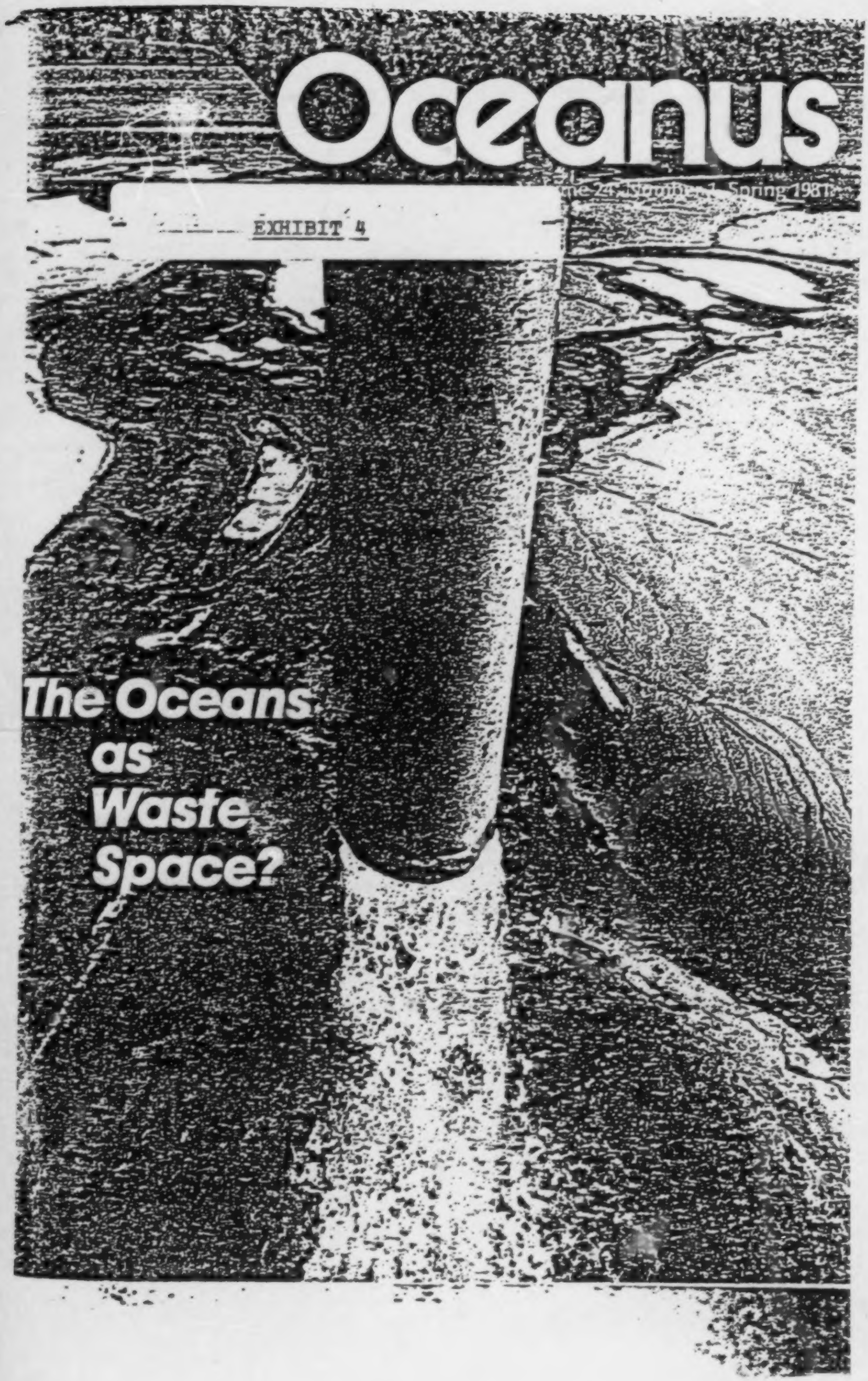
Authority: Section 205(c), 63 Stat. 390; 40 U.S.C. 486(c).

Subpart 5-9.1—Patents

§ 5-9.100 Scope of subpart.

(a) This subpart prescribes policies and procedures for patents and related matters. It prescribes contract clauses be used and provides for assistance in developing clauses when it is not feasible to use prescribed clauses.

(b) Patents are granted for any new and useful process, machine, manufacture, or composition of matte or any new and useful improvement thereof (see 35 U.S.C. 101) and any ne original, and ornamental design for a article of manufacture. (See 35 U.S.C.



Oceanus

me 24, Number 1, Spring 1981

EXHIBIT 4

The Oceans as Waste Space?

The Oceans as Waste Space:

The Rebuttal

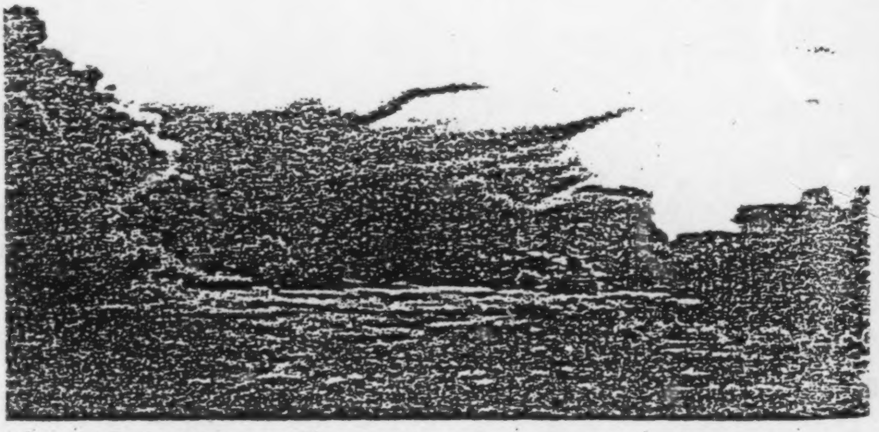
by Kenneth S. Kamlet

Ed Goldberg makes the unobjectionable points that "marine [waste] disposal can in some instances offer economic, social, and scientific advantages over the other two options — atmospheric and land disposal" and that, if the ocean's capacity to receive wastes is used properly, it should serve as a renewable resource. More debatable are Goldberg's assertions that "ocean disposal becomes acceptable when land or atmospheric dissemination of wastes becomes scientifically, economically, or socially unjustifiable" and that "most probably we can predict the fate of wastes entering the oceans better than we can predict the fate of wastes introduced on land."

This article will address these premises, as well as Goldberg's contention that it is not only possible but demonstrable "that effective schemes can be devised for the introduction of highly toxic substances to the marine environment without endangering public health" or ecosystems.

I will offer another perspective for viewing marine waste disposal and will seek to establish the following propositions:

- *The ocean, as a commonly owned (or unowned) resource, is not protected by marketplace and political forces; consequently, ocean disposal should not be permitted for persistent, toxic materials unless disposal in other media has at least marginally greater environmental impacts.*
- *The ocean, as the prototypical dispersal medium, is an inappropriate place to dispose of persistent, toxic materials; the land, which if properly managed is the exemplary containment medium, is, in general, a sounder choice for the management of such wastes.*
- *No waste management strategy can be totally free of risk to health or the environment; management decisions should be based on multimedium comparisons and risk-minimization.*



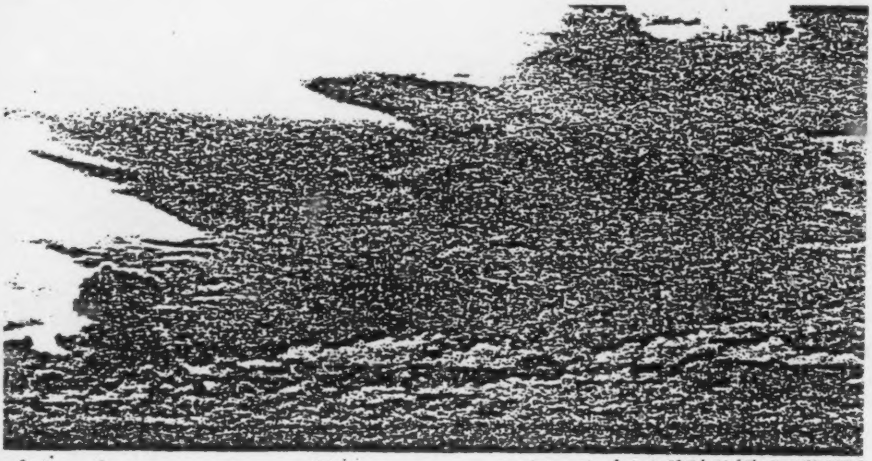
- *In view of the rudimentary ability of marine science to detect, much less correct, problems associated with waste disposal, we cannot prudently rely on a permissive approach based on crude assimilative capacity models in the hope that after-the-fact monitoring and a decades-long response time will ensure that health and the environment are protected.*

The Ocean as a Common Resource

Goldberg argues that ocean disposal is acceptable when disposal in other media "becomes scientifically, economically, or socially unjustifiable." He correctly implies both that the ocean should be viewed as a last rather than first option and that, to the extent disposal in other media becomes more risky, disposal in the ocean becomes easier to justify. I must disagree, however, with the proposition that any discards that are not wanted on land or are deemed too expensive to manage on land should be treated as candidates for ocean disposal. There are good reasons for not treating the ocean as a fall-back waste heap for any material deemed too toxic or too controversial to dump on the land.

One reason is that the ocean, unlike the land, is not protected by the marketplace and political forces that protect private property. If someone proposes to dump toxic wastes on land, those who live or work nearby can be expected to protest. And elected officials can generally be counted on to listen to and support their constituents. The ocean, on the other hand — once one gets beyond nearshore coastal areas — is nobody's backyard, and fish do not vote. So, if we make our ocean disposal decisions on the basis of the sociopolitical acceptability of land-based alternatives, the ocean will always be the disposal medium of choice. Also, would-be land-disposers must purchase and maintain the desired disposal site. Ocean-disposers, on the other hand, have no capital or maintenance costs. Indeed, the U.S. Army Corps of Engineers formally perpetuates and expands this disparity by requiring local proponents of federal navigation projects to furnish all necessary land-based dredged material disposal facilities and to be responsible for needed operation and maintenance. However, where the dredged material is to be ocean-dumped, the local sponsors get a "free ride" — not only out to the disposal site but in unrestricted free use of the site. It is not hard to predict which option will usually be chosen.

The distinction between private and public (or common) property has long been recognized. It was popularized in the late 1960s by Garrett Hardin, a geneticist, who coined the phrase "tragedy of the commons" to describe the phenomenon. Hardin gives the example of a pasture open to all (directly analogous to the ocean). Each rational herdsman can be expected to try to maximize his own gain by keeping as many cattle as possible on the commons. Since each herdsman receives all the proceeds from the sale of an additional animal, the positive utility



(Photo by Jan Hahn, WHOI)

to the herdsman of adding an additional animal is nearly +1. On the other hand, the negative implications of the overgrazing created by one more animal are shared by all the herdsmen. So, the negative utility for any particular decisionmaking herdsman is only a fraction of −1. In Hardin's words:

> *Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another; and another. . . . But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit – in a world that is limited. . . . Freedom in a commons brings ruin to all.*

The ocean is the paradigm of a global commons.

To the extent individuals (or nations) make waste disposal decisions involving the ocean based on individual perceptions of self-interest, ocean disposal will inexorably increase — until the "assimilative capacity" of the world ocean is ultimately exceeded.

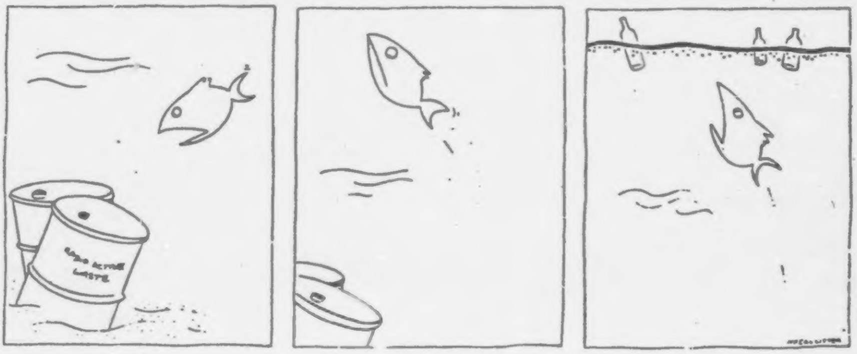
Needler and Templeton (see page 60) recognize this problem. They point out — in the context of sea disposal of radioactive wastes — that "it is certainly not clear that by considering radioactive waste releases only on a case-by-case basis that one is providing the essential protection for the global population." They make the further perceptive observation that:

> *Strictly political decisions also may influence the choice of disposal options. One must hope that the decision to use the marine environment will not be influenced by the fact that the hazard to the producing nation is reduced by marine disposal or that the population is against local disposal, even though the potential hazard to other populations may be much larger. . . .*
>
> *If one assumes that the land areas of nations with favorable geological formations will not be made available to others, some nations on the basis of the optimization requirement may have no choice but to use the marine environment. . . .*

Goldberg, by contrast, points to regulation of radioactive waste discharges to the sea as perhaps providing "the textbook example of the effective use of the oceans as waste space." The Windscale facilities in Britain, and the associated marine modeling and monitoring strategies developed by the British, are cited as a successful example of a marine waste disposal scheme that has been demonstrated as not endangering public health — at least that of the British citizenry. Goldberg then uses the "successful" British experience with assimilative capacities for marine disposal of radioactive wastes as a springboard for urging more general reliance on the assimilative capacity approach.

The success of the Windscale program is a matter of scientific debate. Beyond this, however, any effort to assess assimilative capacities for persistent toxicants on a case-by-case basis (whether directed toward a particular pollutant, waste disposer, or coastal area) is likely to safeguard individual interests at the expense of the world ocean.

The U.S. Congress has, elsewhere, recognized that unless public property is given special protection, it will receive special attention from developers and despoilers. Thus, under the Federal Aid Highway Act, Congress has specified that highways may not be constructed through public parks (and wildlife refuges) unless a) there is



no "feasible and prudent" alternative, and then, only if b) the project includes all possible planning to minimize harm to the park (or refuge). Congress realized that without this extra measure of protection highway builders would preferentially invade public property. Absent of statutory restrictions, such a preference would clearly be in the developer's best interests. No protests from displaced businessmen and residents. No private property to condemn and purchase. No relocation assistance necessary for dispossessed homeowners. Nothing to offset the cost-savings and convenience to the developer of building roads through parks. Nothing except the eventual obliteration of all parks in the vicinity of highway projects.

I would argue that persistent toxic wastes should not be disposed of in the ocean unless there is evidence that there are no "feasible and prudent" land-based alternatives. This should entail, among other things, evidence that the adverse *environmental* impacts of land- or atmosphere-based disposal are at least marginally greater than the environmental impacts of ocean disposal.

The Ocean As a Dispersal Medium

The ocean and inland waters are dispersal media. So is the atmosphere. The land, to the extent pollutants can be kept out of ground and surface waters, is a containment medium.

Is it better to put a persistent toxic material in a dispersal medium or in a containment medium? For persistent synthetic chemicals, such as PCBs, Kepone, DDT, and the like, the answer is clear. The material should be isolated and contained to the fullest possible extent (assuming it cannot be entirely destroyed). For persistent, naturally occurring materials, such as heavy metals and petroleum hydrocarbons, which have natural background levels in the environment, the answer is slightly less clear. A reasonable argument might be made that dispersal-oriented disposal, aimed at diluting these pollutants down to background levels, is a sensible management philosophy. However, large or continuous additions of even such materials can produce harmful departures from background levels, particularly on a localized basis; in such cases, dispersal-oriented approaches seem less plausible.

At the opposite extreme — nontoxic or readily biodegradable materials — the answer is also clear. In such cases, the ocean's assimilative capacity may be enormous. Acids, alkalis, sanitary wastes, and nutrients exemplify this class of materials. A management philosophy aimed at maximizing dispersal of such materials (while avoiding disruption of local ecological systems) will often make the most sense.

Before an assimilative capacity can properly be computed for a particular waste discharged into the ocean — the preeminent dispersal medium — I think it necessary to first determine whether dispersal rather than containment is the preferable management option.

Goldberg acknowledges that for toxic halogenated hydrocarbons, burning and the consequent discharge of combustion products to the atmosphere appears to be "a rational option" (although, apparently not necessarily the *most* rational option in his view). On the other hand, the ocean would be an appropriate disposal medium for "domestic and industrial wastes" which the marine environment "has accommodated. . . in the past."

Need For Multimedium Management

I agree with Goldberg that:

> *For any given material awaiting disposal, there are three options: placement in the oceans, on land, or in the atmosphere. Each has its advantages and disadvantages based on scientific, social, and economic considerations.*

I also agree with the conclusion of the Panel on Marine Waste Disposal (in which Dr. Goldberg and I participated) at the Marine Pollution Policy Workshop (held by the University of Rhode Island Center for Ocean Management Studies, June 25-27, 1980) that:

> *An assessment of assimilative capacity for a portion of the marine environment should be accompanied by a similar assessment for other environmental systems which represent alternative sites for the disposal of a particular waste.*

There is no risk-free way to dispose of persistent toxic pollutants. Management strategies should be designed to minimize risks to health and the environment. This can only be achieved by a multimedium evaluation and comparison of environmental risks and benefits.

The Commission on Natural Resources of the National Academy of Sciences recommended in a 1977 report that the Environmental Protection Agency (EPA) review and revise current sludge disposal policies "in order to recognize the multimedium nature of environmental impacts and to ensure that the relative merits of available options, environmental and economic, are judiciously weighed."

A 1980 draft report of the National Advisory Committee on Oceans and Atmosphere also urges the EPA to "adopt an integrated approach to waste management," and recommends that "wastes should be disposed of in the manner and medium which minimizes risk to human health and the environment, at a price that this Nation is prepared to pay."

Although I endorse the need for a multimedium approach, I believe that the initial comparison should be of the *environmental* merits of the various options. Once the medium of choice is identified from this standpoint, other relevant factors — including economics, technological feasibility, and so on — should be considered. This second-stage analysis should focus on whether the environmentally preferred option can be implemented at *reasonable incremental cost* relative to other options. The approach should *not* be to first decide which option is cheapest or least controversial, and then to decide if and how *that* option can be implemented without unacceptable environmental impacts.

What I find objectionable in Goldberg's formulation is the implication that any waste material that passes muster under an assimilative capacity analysis should be deemed suitable for ocean disposal.

Predictive Abilities of Marine Science

Goldberg relies heavily in his support for the assimilative capacity approach on what he views as the great advances in our knowledge about the oceans during the last 30 years — the ability to determine levels of exposures of organisms to contaminants in the environment, and the capacity of scientists to understand critical pollution problems and propose remedial measures in terms of decades. In any event, as Goldberg sees it, "perfect knowledge is simply unattainable," so we need to do the best we can. Determining an assimilative capacity based on the available, albeit incomplete, wisdom of the day is, in this view, a perfectly defensible and necessary approach.

I must dissent from this view. I submit that our ignorance so far exceeds our understanding in the areas of predicting the fate and effects of marine pollutants, and of successfully remedying problems once they arise, that it would be irresponsible to presumptively permit ocean disposal of persistent toxic pollutants based on available crude assimilative capacity models. Prudence dictates that any presumption must operate in the other direction — at least for persistent toxic pollutants that present a nontrivial short- or long-term hazard potential.

It is foolhardy and wrong to assume that what we do not know cannot hurt us, or that, if unanticipated problems arise, science will be able to remedy them. It is equally wrong to endorse ocean disposal merely because it is cheap and convenient and because an assimilative capacity model does *not* prove it to be obviously hazardous, without also evaluating other disposal alternatives and seeking to *minimize* risk.

Goldberg acknowledges that we need increased knowledge about the chemistry, physics, biology, and geology of the sea before we can be sure that marine waste disposal is consistent with maintaining oceanic resources in a renewable state. He also identifies many problems requiring resolution:

- *finding endpoints measurable in the field;*
- *identifying specific indices responsive to individual or classes of pollutants;*
- *assessing long-term effects of very low levels of pollutants in the sea;*
- *understanding synergistic and antagonistic effects of collectives of pollutants or individual pollutants; and*
- *determining amounts and compositions of discharged wastes going to the oceans today and in the near future.*

In the Crystal Mountain proceedings, Goldberg listed an additional knowledge gap: "following the fate of discharged materials in the coastal environment."

Although we might confidently rely on an assimilative capacity approach were an appropriate and sufficiently sensitive endpoint used, and were the data base reliable, we are far from such a state of grace. As Goldberg's own statement about the gaps demonstrates, what we don't know is almost everything.

Goldberg briefly discusses the four coastal sites and assimilative capacity models discussed at Crystal Mountain. He uses this to support two propositions: 1) that "the assimilative capacities of U.S. coastal waters are not being fully utilized," and 2) that the Crystal Mountain exercise demonstrates that assimilative capacity models are in fact "a scientific basis for regulating the discharge of wastes to coastal waters."

I believe the Crystal Mountain proceedings themselves belie these contentions — at least for the foreseeable future. Let me take the New York Bight panel, in which I participated, as an example.

Of the four contaminants and endpoints selected for evaluation, the panel concluded that no assimilative capacity could be estimated for the human health effects of pathogens in the New York Bight because the existing data base is inadequate. And, although the panel did reach conclusions for the other three, it significantly qualified the results in each case.

Thus, although the panel concluded that present PCB inputs to the Bight could safely (without adverse human health impacts) increase in the future (but definitely not by an order of magnitude), it emphasized that the analysis did not address the fact that other animals of the Bight apex ecosystem, such as bivalves, raptorial birds, and finfish, would require much lower levels of PCBs to be fully protected.

Similarly, although the panel concluded that urban nitrogen loads are at worst no more than 10 to

25 percent of the assimilative capacity of the Bight apex in terms of producing anoxia, it cautioned that an endpoint of higher oxygen content might, in practice, represent a better choice. With such an endpoint the apex would assimilate a smaller additional nitrogen load.

Finally, the panel concluded that cadmium levels in Bight sediments could currently be approaching or exceeding safe limits for shellfish in parts of the Bight. However, the panel found that existing data did not permit "rigorous development of a carrying capacity algorithm based on [cadmium] concentrations in marketable shellfish," which forced it to consider a range of "possible" partition coefficients between shellfish and sediments (varying by a factor of 25) in order to do an assimilative capacity calculation.

More generally, both the Crystal Mountain participants and the URI Workshop concluded that assimilative capacity analyses could be misleading unless a number of factors were taken into account:

- *The quantity of a pollutant that an ocean segment can accept without a particular undesirable impact depends on the effect one chooses to consider.*
- *An area's assimilative capacity for a given pollutant will be smaller if one considers effects on sensitive rather than hardy organisms and more important rather than less important routes of exposure, and if one includes significant impacts that we cannot yet measure because of their long time scale, the insensitivity of our measuring techniques, or their subtlety in relation to natural fluctuations (for example, we have not yet identified the causal agent of finrot disease).*
- *One cannot assume that undesirable impacts will be avoided unless assimilative capacities are separately determined for each important uniform subdivision of the area being considered (for example, Hudson River discharges could have an insignificant impact on the New York Bight, yet have a devastating impact on the Hudson River estuary).*
- *Assimilative capacities must be established for the most sensitive or critical portions of the system being considered.*
- *Management decisions based on assimilative capacities of individual contaminants must recognize that combinations of contaminants can and do have cumulative effects.*
- *The marine environment's assimilative capacity is dependent on the rates of natural processes and must consider time and space scales.*
- *Assimilative capacity approaches are not a substitute for an initial screening of a waste for acceptability prior to marine disposal.*
- *There is inadequate information in most regions of the United States on the chemical constituents, sources, and mass balance of pollutants discharged into the marine environment.*

In short, although I agree that "perfect knowledge is simply unattainable" and that we must make waste management decisions on the basis of available scientific wisdom, I do not think we can justify permissive decisions about ocean disposal on the basis of the crude and misleading assimilative capacity models presently accessible. (Such models may, however, be useful — despite their limitations — in helping to assess the need for restricting ocean disposal of certain pollutants.)

Limitations of Monitoring

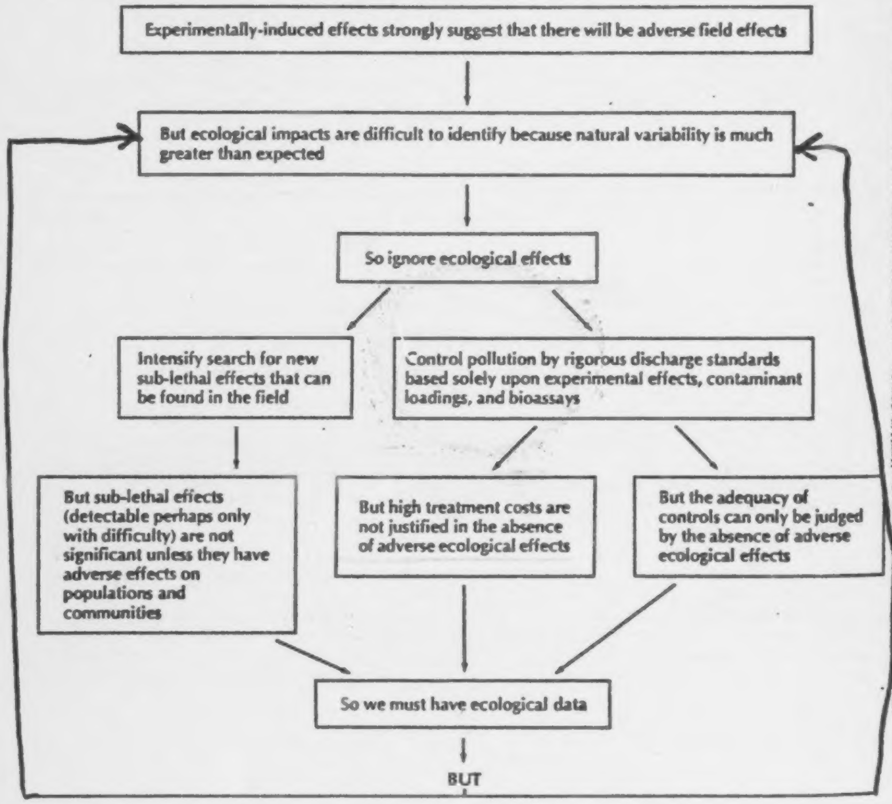
Goldberg finds encouraging the fact that scientists can reach an understanding of a critical pollution problem and can propose remedial actions in terms of decades and that "successful" monitoring activities, such as Mussel Watch, have been mounted that enable marine scientists to follow pollutant exposures of marine organisms. Presumably, this suggests to him that even imperfect assimilative capacity models can be safely used without a serious risk of catastrophic, irreversible harm to health and the environment — even if the models understate the potential for environmental impact.

Again, this is a debatable proposition. Although it may take decades to identify and rectify a problem once a persistent toxic chemical enters the environment, it may take only months or years for the problem to reach crisis proportions. (During this period irreversible or irreparable damage can be done.) For example, in the case of Kepone, within two years of the commencement of its inadequately controlled production at a converted service station, Kepone workers had experienced serious health problems and river sediments had been contaminated to the point that a multimillion dollar seafood industry had to be virtually closed down.

And, although it took a number of years for DDT and PCBs to accumulate in the environment to the point that serious ecological damage became evident, several species of predatory birds were brought to the brink of extinction before the decision was made to ban the production of these chemicals. Since we are still far from being able to routinely monitor the reproductive effects of toxic chemicals (for example, via effects on steroid metabolism), it seems entirely possible that the next time we are forced to deal with an organohalogen or like compound released into the environment, we will be too late to save sensitive species (possibly including man, someday) from extinction.

Our knowledge of the deep ocean has been likened to what we would learn about Washington, D.C., by taking grab samples of trees, buildings, and alleycats from a high-flying helicopter.

Table 1. Considerations regarding environmental evaluation. (Lewis, 1980)


Experimentally-induced effects strongly suggest that there will be adverse field effects
But ecological impacts are difficult to identify because natural variability is much greater than expected
So ignore ecological effects
Intensify search for new sub-lethal effects that can be found in the field
Control pollution by rigorous discharge standards based solely upon experimental effects, contaminant loadings, and bioassays
But sub-lethal effects (detectable perhaps only with difficulty) are not significant unless they have adverse effects on populations and communities
But high treatment costs are not justified in the absence of adverse ecological effects
But the adequacy of controls can only be judged by the absence of adverse ecological effects
So we must have ecological data
BUT

A British scientist, John Gray, has pointed out that marine biological monitoring efforts are of questionable value since the ecological models on which they are based are unable to detect subtle, naturally occurring changes and neglect the majority of the living components of marine ecosystems. For example, Gray notes that the number of samples taken in a biological survey is usually governed by the manpower and facilities available, and the types of organisms collected depend on the available expertise. Usually, only the common species of macrofauna are identified. The small meiofauna that pass through a 0.5-millimeter sieve, and which are usually disregarded, are roughly two orders of magnitude more abundant than the macrofauna. Similarly, most surveys tend to overlook rare species. In doing so, they ignore one of the intrinsic ecological properties of biological samples: the majority of animal species are rare in nature.

Another British scientist, J. R. Lewis, has convincingly argued (see Table 1) that the two prevailing strategies for controlling environmental impacts both suffer from the same inherent shortcoming: in the absence of demonstrable adverse ecological effects (which are difficult to identify because of greater-than-expected natural variability), it is hard to show the significance of observed effects, to justify high treatment costs, or to judge the adequacy of control measures. The two strategies are: increased field testing of sublethal effects, and rigorous control of discharges based on contaminant loadings and bioassays. Lewis proposes that more effort be expended between the two extremes of laboratory effects and community ecology "where the expected effect seems to be lost."

The most relevant future research perhaps should be aimed, as Lewis suggests, at understanding pollutant pathways, immobilization, degradation, and the like; "linking effects studies, contaminant loadings, bioassays and ecology"; and concentrating effects and accumulation work on "those species which have a key ecological role in particular communities" and the loss of which could have considerable community consequences, rather than focusing merely on good accumulator species of high tolerance.

Conclusions

As Lewis puts it, "It is . . . becoming disconcertingly apparent that broadscale field effects [of marine pollution] are less convincingly demonstrable than was expected." The challenge facing the marine science community is to find out why. Is it because chronic effects on communities are negligible and only acute pollution matters? Or, is it because we are measuring the wrong things, unable or unwilling to measure the right things, or otherwise going about the task in the wrong way?

I think the effort to develop new and more reliable field tests of chronic effects is a step in the right direction. But I also believe that, at least where persistent toxic substances are involved, we must adopt a cautious, preventive approach. This means setting regulatory standards based on projections from laboratory experiments and mass balance models. If it turns out we are being more protective than necessary, posterity will forgive us. In the meantime, we must strive to bridge the gap between alarming laboratory results and elusive field measurements.

The assimilative capacity construct is most useful as an organizing principle. To the extent it helps to focus research and monitoring on relevant questions, it is beneficial. It also can be valuable in defining the *lower* limit of needed regulation. However, to the extent that Goldberg would hold out assimilative capacity assessments, now or any time soon, as a sufficient basis for predicting the hazard potential of persistent toxicants in the marine environment, I must dissent.

Kenneth S. Kamlet, a biologist and lawyer, is Assistant Director for Pollution and Toxic Substances at the National Wildlife Federation, Washington, D.C.

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Citizens Debate Land Application

EXHIBIT III EXHIBIT 5

Helping Politicians to Make The Best Decisions

"It would be tragic indeed if we continue to bumble along, placing our sludge and other waste disposal facilities only where the local residents are not politically strong enough to keep them out. It is high time that the politics came out of waste disposal siting decisions and good judgment went in."

KENNETH S. KAMLET
Manager
Toxic Substances Project
National Wildlife Federation
Washington, D.C.

IRRESPONSIBLE INDUSTRY landfilling practices for hazardous wastes have received a lot of press attention recently. It is safe to assume that the conditions reported at places [illegible]: the Love Canal and the "Valley of [illegible]e Drums" have only served to increase the public's innate skepticism about use of the land for disposal of hazardous and toxic wastes. Increased public awareness of toxic substance problems may, unfortunately, also complicate the unenviable task of environmental regulators and municipal sewage treatment officials who must find a safe resting place for the five million dry tons a year of sewage sludge being produced by the more than 22,000 treatment plants around the country.

Not only does sewage sludge contain nasty bacteria (to say nothing of viruses, fungi, and parasitic worm eggs), but in most big cities, it also contains lots of toxic chemicals — gratefully contributed by local industry, anxious for the anonymity of being able to pump the foul stuff down the drain, rather than having to put it right into a river through a conspicuous outfall pipe. Spreading the sewage sludge around the cities that generate it [illegible]ght strike one as poetic justice; however, the sad truth is that our biggest cities which generate the most and the dirtiest sludges are also the least able to accommodate them. They are just too congested. So, the big cities try to export the sludge to the surrounding countryside where more land is available.

It is not hard to understand why the predictable reaction, time after time, is: "Nothing doing! Put it in your own backyard!"

It is somewhat ironic that — even with big city sludges — managed land application of sewage sludge is frequently preferable environmentally (and from a public health standpoint) to most other available alternatives. Persuading the average citizen of this, however, is going to be like trying to persuade Fay Ray's father that King Kong is just your typical guy next door. Much more public understanding is clearly needed. And so is much more of an effort on the part of public officials to involve the public at an early stage and take the effort necessary to resolve citizen problems and alleviate citizen concerns.

This is not to say that decisionmakers should choose the path of least resistance and make choices based upon public opinion polls or the strength of the opposition's vocal cords. This would be political cowardice. Rather, regulators have the duty to themselves choose the sludge management alternative which poses the least risk to public health and the environment. To be sure, public opinion will and should play an important role in this assessment. However, the emphasis should be on thorough research of a proposal's strengths and weaknesses, together with an honest, conscientious, and early effort to inform and involve the affected public. Everything possible must be done to resolve legitimate concerns and to satisfactorily alleviate false fears. And there must be a willingness, hopefully on both sides, to reassess preconceptions in the face of new facts.

Making choices based upon public opinion polls or the strength of the opposition's vocal cords would be political cowardice.

Obviously, the more facts are available, and the more reliable they are, the easier this will be, and the better will be the final decision. For this reason, this paper emphasizes factual principles as the best means of public and political persuasion.

There are two essential starting points for any analysis of sludge management alternatives: first, that no alternative can be totally free of risk — especially where contaminated sludges are involved; and second, that no single sludge management alternative can be evaluated in isolation, without carefully comparing it to other approaches that might be used instead.

A committee established by the National Academy of Science's Commission on Natural Resources issued a report in 1977, entitled "Multimedium Management of Municipal Sludge," which attempted to assess sludge management alternatives by comparing sludge disposal in different media on the basis of six evaluation factors which the Committee regarded as most pertinent.

The evaluation factors chosen by the NAS Committee were the following:

1) FLEXIBILITY — including the ability to switch sludge management operations both within one medium and among environmental media (must be considered from the standpoints of (a) site selection, (b) technological options, and (c) required capital investment);

2) BENEFITS — environmental and economic;

3) RISKS — primary and secondary risks to the environment and the adequacy of the means by which risks can be reduced and procedures improved;

4) PUBLIC ACCEPTANCE — which will often be dictated by (and not solely be a determinant of) the sludge management alternative selected;

5) KNOWLEDGE — including gaps in available information regarding environmental risks; and

6) RELIABILITY — including the proper functioning and ease of operation of the technology once installed.

Although the Committee failed to take the logical last step of attempting an overall ranking of disposal media based on these factors, a matrix can be constructed, using the Committee's factors, which assigns a score of 1, 2, or 3 to each medium for each evaluation factor (1 being best; 3 being worst). Using my own subjective scoring system, land emerged strongly as the disposal medium of first choice, with the air and the ocean achieving nearly equivalent lower rankings (Table I). The NAS report itself, however, appears to endorse ocean disposal over land disposal or use, on the basis of what appears to be a policy of minimizing economic risk:

> In selecting options, risks of irreversible impacts, should be minimized by making management choices adaptable to future conditions. Therefore, the option that necessitates the minimum initial commitment of capital, energy, or other resources should be given first consideration. For example, more uncertainties may appear to be associated with ocean disposal of sludge than with land disposal or use. On the other hand, the capital investment involved in ocean disposal for a coastal metropolitan area may be less than that for a pipeline or other fixed facility required for moving sludge to distant land disposal sites. Where this is the case, the decision should take into account comparative capital costs, the possibility of reducing risk by careful monitoring, and that both land and ocean disposal have risks. If ocean disposal is found to be unsuitable after extensive monitoring, a substantially lower capital investment would have been made than if land disposal had been tried first and found unacceptable.

What this approach seems not to consider is that continuation of present ocean dumping practices does not merely defer a difficult decision; it *is* a decision, with present environmental and societal risks.

This point was aptly made by the Interstate Sanitation Commission, an interstate planning body with jurisdiction over New York, New Jersey, and Connecticut, in a 1976 report on sludge management options for New York and New Jersey:

> A difficulty which plagues the region, and which must concern anyone attempting to make or reaffirm a sludge management program is that scientific data on the effects of sludge and its ingredients are by no means as complete as they could be, nor are their interpretations free from controversy. Accordingly, it is difficult in objective terms to assert categorically that human welfare requires the universal adoption or prohibition of any given sludge method. Nevertheless, it is often necessary to make decisions in the absence of complete knowledge and on the basis of the best that can be known and chosen at the time. The reason is that sludge disposal is a continuous necessity. Adherence to present practices [i.e., ocean disposal] is itself a decision, even if it is usually less conscious and attention-catching than a change. But decision cannot be postponed because the sludge cannot be left to accumulate.

I have attempted to develop a ranking system of my own which seeks to take explicit account of a number of fundamental ecological considerations which are frequently overlooked in doing the usual cost-benefit analyses. The proposed matrix does not pretend to be mathematical or quantitative; the reader is free to alter the weighting factors to suit his own perceptions of what is a proper balance. The important point is that these factors require consideration early in the decision-making process, not as an afterthought merely to bolster a decision already made on economic grounds. Since environmental factors are difficult to quantify and generally fare poorly when weighed against traditional economic considerations, the only way to ensure that they receive adequate attention is to require them to be considered first. Once the alternative is identified which is best from an environmental standpoint, competing considerations (e.g., of economic cost and energy consumption) can and should be factored in.

TABLE I

DISPOSAL MEDIUM	*Evaluation Factors**					*TOTALS*
	Flexibility	*Benefits*	*Risks*	*Knowledge*	*Reliability*	
LAND	5(2+1+2)**	1	2(1+1)**	1	2	11 (Best)
AIR	8(3+3+2)**	2	4(2+2)**	2	3	19 (Worst)
OCEAN	4(1+2+1)**	3	6(3+3)**	3	1	18

Overall rankings of disposal media for sewage sludge in terms of alternative evaluation factors recommended by NAS Committee.

**"Public acceptance" was not included in this tabulation because it is as much based upon as it is a determinant of the alternative selected.*

***Values greater than 3 result from the consideration of subfactors.*

The following nine factors are illustrative of the ones that should be highlighted in any system for ranking disposal media for sewage sludge in terms of environmental and public health considerations:

1) CONTAINMENT ("CT'T.") — the air and the ocean are dispersal media, while land can contain and immobilize sludge constituents. If a problem should arise, it is more easily analyzed, remedied, and kept from spreading on land. This is probably the single greatest advantage of controlled land application of sludge.

2) ECOSYSTEM DYNAMICS ("EC. DYN.") — terrestrial animals have defined "home ranges"; marine (and other aquatic) animals do not. This results in less opportunity to keep track of contaminated organisms in the ocean than on land.

3) MONITORING ("MON.") — an adequate environmental monitoring strategy for tracking the fate and effects of potential sludge contaminants is more feasible on land than in the ocean. Among other considerations, it is far easier to hop in a car and take a short drive out to a land application site than it is to charter a research vessel and crew to study a distant ocean dumpsite.

4) LOCALIZATION ("LOC.") — "short dumping" is a serious problem in the ocean; it is not a problem for either land or air methods, where pin-

TABLE II

DISPOSAL MEDIUM	CT'T.	EC.DYN.	MON.	LOC.	FD.CHN.	BIODEG.	CONTAM.	ADAPT.	VALUE	TOTALS
	Evaluation Factors (see text)									
LAND	1	1	1	1	1	2	1	1	1	10 (Best
AIR	2	2	2	1	2	1	2	2	2	16
OCEAN	2	3	3	2	3	3	3	3	3	25 (Worst)

Overall rankings of disposal media for sewage sludge in terms of alternative environmental evaluation factors.

pointing the discharge point is easy.

5) FOOD CHAIN COMPLEXITY ("FD. CHN.") — biological food chains tend to be more complex in the ocean than on land. Among other consequences of this is a reduced potential for a high-degree of biomagnification of contaminants in the land environment. Initial bioaccumulation is also less likely to be a problem on land than in the water, since aquatic organisms have evolved with the unique capacity to bioconcentrate nutrients and other chemicals in minute amounts from the surrounding medium. Edible shellfish, for example, are champion bioaccumulators with no real rivals on land.

6) BIODEGRADATION ("BIODEG.") — chlorinated organic compounds are probably more susceptible to microbial breakdown in soil than in the ocean (in part, because the former provides a stable substrate on which bacterial action can occur).

7) FOOD CHAIN CONTAMINATION ("CONTAM.") — many of the physical, chemical, and biological processes which determine the potential for contamination of biological food chains (in addition to bioconcentration potential and food chain complexity) differ sufficiently and in such a way between land and ocean sludge disposal systems that the potential for exposure of man (and other predators) to contaminants in the food chain is far less on land than in the ocean. For example, certain toxic heavy metals which are very damaging in the ocean — e.g., mercury, lead, and chromium — are strongly bound to soil in the land environment and prevented from entering the food chain. Physiological processes also operate to minimize the entry of heavy metals into the reproductive parts (grain, seeds, fruit) of terrestrial plants.

No sludge management alternative is entirely free of risk . . . and none can be evaluated in isolation.

8) ADAPTABILITY ("ADAPT.") — terrestrial organisms are generally more adaptable to and tolerant of environmental changes than their open ocean counterparts, because the latter evolved largely insulated from external stresses.

9) RESOURCE VALUE ("VALUE")—sewage sludge has many values as a resource which can be recovered on land, but not in the ocean.

It should be hastily emphasized, however, that no system of analysis can be a substitute either for common sense or for painstaking insistence on the use of all feasible risk-minimization measures. For example, pretreatment, source reduction, and recycling of toxic chemicals discharged into municipal treatment plants is an essential feature of any sludge management system. (It will not be possible or desirable in many cases, however, to delay regulatory action until pretreatment measures have been accomplished.) Persistent, toxic contaminants must be kept out of sludge — and out of other waste streams — to the fullest possible extent. Similarly, the mere determination in a given case that land application is the best approach, neither guarantees that it will similarly be best in other cases, nor does it obviate the need for painstaking attention to the details of system design and operation, to ensure that everything reasonably possible is done to protect health and the environment.

It would be tragic indeed if we continue to bumble along, placing our sludge and other waste disposal facilities only where the local residents are not politically strong enough to keep them out. It is high time that the politics came out of waste disposal siting decisions and good judgment went in.

Although thermal methods (incineration, pyrolysis) which vent sludge by-products to the air have not been specifically discussed in this brief analysis, it is clear that these methods will share some of land application's benefits (e.g., limiting food chain contamination by destroying toxic organics, and providing some offsetting resource value) and some of ocean dumping's disadvantages (e.g., difficulty of containment and monitoring of dispersed contaminants). Applying a matrix analysis, and assigning a score of 1, 2, or 3 to each medium for each evaluation factor as before (1 being best, 3 worst), an overall ranking can be made. Using my own subjective scores, land application again emerges a strong favorite, with air methods second, and ocean methods a distant third (Table II).

"Our wastes may well do us in before hunger or war gets around to it."

It should be noted that the environmental factors employed in this analysis were developed in part on the basis of testimony presented at a seven-day adjudicatory proceeding held by the U.S. Environmental Protection Agency in Washington, D.C., May 19-29, 1975. The hearing considered the relative merits and demerits of the ocean dumping of sewage sludge by the City of Philadelphia and various land-based alternatives. In doing so, it amassed many thousands of pages of testimony and exhibits and heard from dozens of expert witnesses. (Copies of the transcript of the hearing should be available for inspection at the EPA offices in Philadelphia and Washington, D.C.). I have followed the technical literature as closely as possible since that time, and the environmental analysis provided above appears to remain sound.

The management of waste solids is one of the most pressing environmental problems facing society. Our wastes may well do us in before hunger or war gets around to it. It is imperative therefore that waste management and disposal decisions be made in a rational way and with a view to maximizing scarce societal resources. The matrix approach described above is one (simplistic) way of selecting among waste disposal options.

EXHIBIT 6

~~Archives Committee Expands Collection~~

~~A series of old photographs has been received by the WPCF Archives Committee from Federation Past President Earnest Boyce, who served as president in 1951-52. The committee is continuing its effort to collect photographs and other memorabilia from the history of the Federation.~~

~~This photograph, at Washington's Willard Hotel, was taken during the 1932 meeting of the Conference of State Sanitary Engineers, an important force in the formation of the WPCF in 1928. Standing left to right are Lyle Stephenson, state sanitary engineer from Pennsylvania; Ellsworth F. Filby, state sanitary engineer of Florida; Victor Ehlers, state sanitary engineer of Texas; Jane Rider, state sanitary engineer of Arizona; Ralph Tarbett, chief sanitary engineer, U.S. Public Health Service; and Earnest Boyce, state sanitary engineer of Kansas.~~

~~The Archives Committee welcomes submissions of material on the history of the Federation. Send material to Ralph Fuhrman, Archives Committee Chairman, at WPCF. Please include as much caption material as possible with each item.~~

~~Free Catalog Lists WPCF Resources for 1982~~

~~WPCF's Marketing Department has released its *1982 Publications* booklet, available free to members who request it. The 18-page booklet lists virtually all of the Federation's educational resources, including manuals of practice, periodicals, audiovisual training materials, and other publications. A special subject index is a new feature of the booklet, allowing members to locate all the Federation material available on a particular topic. The catalog includes a price list and order form for publications. For a free catalog, send the coupon below to WPCF Marketing Dept., 2626 Pennsylvania Ave. N.W., Washington, DC 20037.~~

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Letter to the Editor

Sludge on Land

In the November 1981 issue of *HIGHLIGHTS*, we noted with chagrin the story, "Cornell Study Says Sludge Too Toxic for Land Use." This story obviously was taken from an August 8, 1981, news release entitled," Cornell Studies Show Sludge Too Toxic for Land Use." This news release and the position represents the personal opinion of Donald J. Lisk, professor of vegetable crops at Cornell University. Cornell has no policy on recommended sludge disposal practices and has never recommended incineration as the safest method of sludge disposal.

We are concerned with the news release because we do not share the opinion expressed and feel that the position is largely unjustified. In general, we agree with the position formally established by the U.S. Department of Agriculture, the U.S. Food and Drug Administration, and the U.S. Environmental Protection Agency that it is safe to use certain sludges in agriculture. We further feel that the land application of sludges can represent the most cost-effective means available for controlling this kind of pollution in many locations. We feel that the growing base of scientific information supports the controlled use of land as a sludge management alternative.

The costs of incineration, both in capital investment and energy, are unacceptable for many communities, particularly smaller communities. We hope that our colleagues will continue to consider land application as a viable alternative for the utilization and disposal of sludge.

William J. Jewell
Lewis M. Naylor
Raymond C. Loehr
Richard I. Dick
Cornell University
Dept. of Agricultural Engineering

~~Editor's Note~~

~~Notices of meetings, events, new publications, or anything else worthy of note to the water pollution control world should be sent to Kevin C. Flynn, editor, *HIGHLIGHTS*, 2626 Pennsylvania Ave. N.W., Washington, DC 20037. Please note if you're a member of WPCF and if the information is related to your Member Association activities.~~

HIGHLIGHTS (Water Pollution Control
Federation)

JAN 26 1982
CENTRAL MAIL

sludge NEWSLETTER
Generation • Treatment • Utilization • Disposal

Vol. 7 No. 2 January 22, 1982 Page 9

SLANTS & TRENDS

~~MUNICIPAL SLUDGE AND OTHER NON-HAZARDOUS SOLID WASTE regulatory functions continue to slide down the ladder of importance at the federal level, as hazardous waste issues simultaneously rise. According to sources in EPA's Office of Solid Waste and Emergency Response, reorganization of the office set to take place next month will drive home the de-emphasis in the federal role in sludge and other solid waste disposal that was initiated last spring by Reagan budget cutters (SLUDGE, March 18, 1981, p. 43). Three major solid waste programs within OSWER, the Land Disposal Division, the resource recovery branch, and the public information and participation branch, will be downgraded or cut under the new scheme. Sludge program and the groundwater protection program, presently under Land Disposal, will be consolidated into a new branch under Jack Lehman's Hazardous and Industrial Waste Division. See story on page 11.~~

* * *

~~REAUTHORIZATION OF THE CLEAN WATER ACT in Congress this year should include a new look at, among other issues, industrial pretreatment and ocean discharge waivers, according to top agency officials. In a Jan. 19 letter to House and Senate members, EPA Administrator Anne Gorsuch commented that categorical standards in pretreatment programs "might be redundant in some cases." Secondary treatment, recent studies indicate, removes greater amounts of heavy metals and toxic organics than Congress realized when the act was amended in 1977, she wrote. Deputy Administrator John Hernandez last week said the agency would be looking at allowing municipal ocean discharge waivers in cases where greater adverse impact on the environment would be caused by additional treatment, and the resulting sludge, than from directly discharging the wastewater. Specific amendments will be offered by the agency in March.~~

* * *

GROUP OF CORNELL UNIVERSITY RESEARCHERS, in a letter to *SLUDGE* last week, joined the growing list of vocal opponents to the controversial views of Cornell toxicologist Donald Lisk, who claims that sludges of all types are for the most part too toxic for any form of land application (SLUDGE, Oct. 28, 1981, p. 169). "We are concerned," wrote William Jewell, Lewis Naylor, Raymond Loehr and Richard Dick, "because we do not share the opinion expressed (by Lisk) and feel that the position is largely unjustified... Cornell University has no policy on recommended sludge disposal practices and has nver recommended incineration as the safest method of sludge disposal." The four researchers agree, in general, with the position established in the policy and guidance package addressing application of sludge to cropland developed by EPA, Department of Agriculture and the Food and Drug Administration (SLUDGE, Jan. 22, 1981, p. 10). "We further feel," they wrote, "that the land application of sludges can represent the most cost-effective means available for controlling this kind of pollution in many locations. We feel that the growing base of specific information supports the controlled use of land application of sludge as a management alernative."

Leonard A. Eiserer • *Publisher* Raymond H. Swan • *Editorial Director* Chris Newkumet • *Editor*

Sludge (ISSN 0148-4125) published biweekly. Subscription rates: $137 per year, $70 for six months. Subscribers outside U.S., Canada, and [illegible] without express permission from the publisher. POST-

EXHIBIT 7

The Philadelphia Inquirer

An Independent Newspaper
Published Every Morning by Philadelphia Newspapers, Inc.
400 N. Broad Street, Philadelphia, Pa. 19101

SAM S. McKEEL
President

EUGENE L. ROBERTS JR.
Executive Editor

EDWIN GUTHMAN
Editor

Saturday, September 5, 1981 ◆ Page 8-A

EPA must stand firm on ocean-dumping deadline

Under orders of the Congress, ocean disposal of sewage sludge must end by Dec. 31, 11 years after passage of the federal Marine Protection, Research and Sanctuaries Act. The deadline was set after scientific studies proved that years of dumping sludge had contaminated surrounding ocean water, seabed and aquatic life with toxic pollutants such as oil, metals, PCBs and other substances. The long-range effects of that are not entirely known, but are perilous.

Philadelphia, New York, Camden and several northern New Jersey municipalities that barged their sewage sludge to sea fought the deadlines imposed by the U.S. Environmental Protection Agency. After granting the cities additional time to find suitable land-based sludge disposal methods, the EPA adopted a get-tough policy to force the cities to halt ocean-dumping. In April 1977, the EPA fined Philadelphia $225,000 and set a strict timetable for alternative sludge disposal.

Despite Philadelphia's opposition to the EPA's actions, the city ended ocean-dumping a year before the 1981 deadline and, in fact, has put the sludge to beneficial uses on land, including reclamation of barren strip-mined land, and soil supplements in the city and on home lawns and gardens. Camden halted its ocean-dumping in 1978 and now uses its sludge for composting material.

The city of New York and the northern New Jersey municipalities still are dumping their sludge in the ocean. The EPA currently is reviewing its deadline for New York to halt that disposal practice, following a lawsuit brought by the city which still is pending in the courts. That leaves the six municipalities, which have asked the federal court in Newark to invalidate portions of the EPA's ocean-dumping rules in order that they can continue ocean disposal.

One of the most noteworthy aspects of the lawsuit is the apparent shift in thinking on the part of the EPA under the Reagan administration. EPA officials have expressed a willingness to allow New York and the New Jersey communities to continue dumping if they barge the sludge further offshore. The waste materials are now dumped 12 miles out in the New York Bight, a shallow body of water off northern New Jersey that is considered to be the most degraded coastal area in the country.

The National Wildlife Federation and its affiliate, the New Jersey State Federation of Sportsmen's Clubs, have gone to court to defend the federal ocean-dumping regulations as applied to the New Jersey communities. According to a lawyer for the wildlife organization, "If we hadn't gotten involved in this lawsuit, there would be no one arguing on behalf of the oceans."

The New Jersey municipalities claim the alternatives to ocean disposal of sludge are unsatisfactory — an argument raised in the past by Philadelphia and Camden. That argument proved fallacious in the 1970s, even when technology was not as far along as it is today. The experience of Philadelphia and Camden, plus the technical advances in the intervening years, render it even more meaningless.

EPA's lack of enthusiasm for enforcing the Marine Protection, Research and Sanctuaries Act is a cause of alarm. Scientific research in the past decade has indicated that perhaps the threat of ocean dumping of toxic materials, including sewage sludge, may not pose as serious an immediate threat to the world's environment as was feared when the act was passed. But even the most optimistic scientist cannot predict what the long-term effects will be. There are proven methods of disposing of the materials on land. Ocean dumping of sludge must be halted.

WAIT! LOO
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Letters to t

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To the Editor:

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C.S.

Glenside

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To the Editor:

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MOSS LANDING MARINE LABORATORIES

EXHIBIT 8

P.O. BOX 223
MOSS LANDING, CA 95039
(408) 633-3304

April 24, 1981

Dr. Kenneth S. Kamlet
National Wildlife Federation
1412 Sixteenth St., N.W.
Washington, D.C. 20036

Dear Dr. Kamlet:

Just a quick note to congratulate you on your recent article that appeared in the spring 1981 issue of Oceanus. Your views parallel my own very closely.

I also served on one of the Crystal Mountain panels (So. Calif. Bight) and left the meeting (as usual) with the feeling that very little was really settled. We certainly did not generate enough information (and we are still no closer) to make meaningful decisions of any kind regarding the concept of "Assimilative Capacity'. I am becoming more and more frustrated with our national approach to waste disposal but it appears that the pendulum is swinging away from even minimal environmental concern (sigh). Anyway, I'm glad everyone is not rolling over and playing dead...a breath of fresh air.

I have enclosed a preprint of an article (submitted to L&O and presented at the recent NATO meeting on trace elements held in Erice, Sicily...again headed by Goldberg) which strongly supports your 4th proposition; i.e., our understanding of potential long-term perturbations a la the marine environment is indeed "rudimentary". Hang in there!

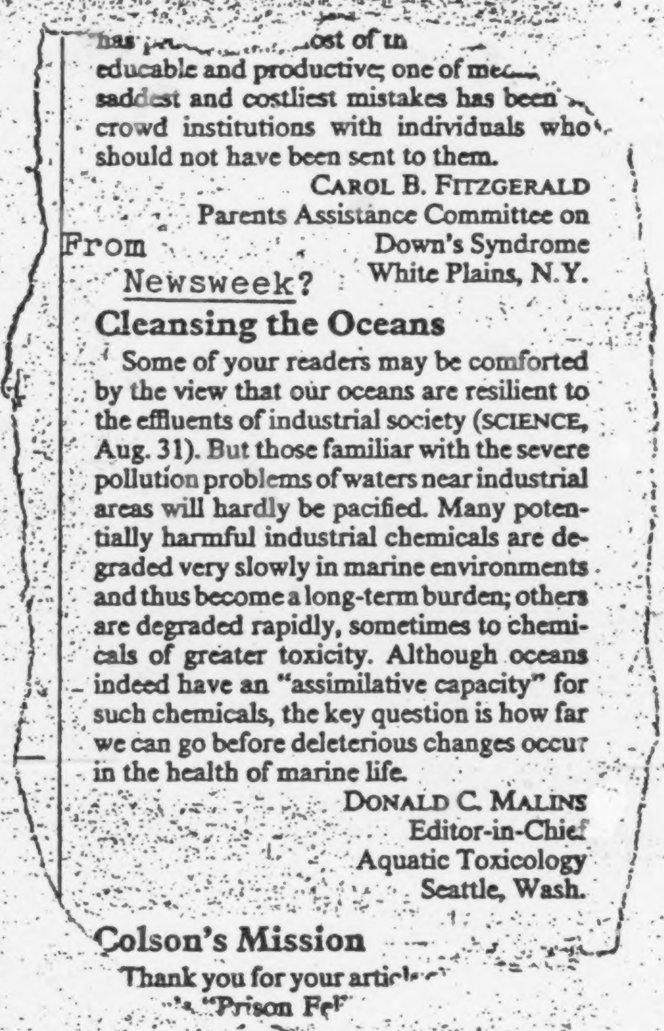
Sincerely yours,

George A. Knauer

George A. Knauer
Associate Professor
Biological Oceanography

P.S. If Oceanus issues enough reprints, I'd appreciate a couple.

EXHIBIT 9



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crowd institutions with individuals who
should not have been sent to them.

CAROL B. FITZGERALD
Parents Assistance Committee on
Down's Syndrome
White Plains, N.Y.

From
Newsweek?

Cleansing the Oceans

Some of your readers may be comforted by the view that our oceans are resilient to the effluents of industrial society (SCIENCE, Aug. 31). But those familiar with the severe pollution problems of waters near industrial areas will hardly be pacified. Many potentially harmful industrial chemicals are degraded very slowly in marine environments and thus become a long-term burden; others are degraded rapidly, sometimes to chemicals of greater toxicity. Although oceans indeed have an "assimilative capacity" for such chemicals, the key question is how far we can go before deleterious changes occur in the health of marine life.

DONALD C. MALINS
Editor-in-Chief
Aquatic Toxicology
Seattle, Wash.

Colson's Mission

Thank you for your artic
"Prison Fel

LETTERS

Dredging

Dear Sir: The April issue of *ES&T* contained three articles (pp 326–338) on dredged material regulation and research. In view of the National Wildlife Federation's considerable interest in this subject, we are moved to offer the following comments.

The articles by Lee and Smith point up one of the biggest problems in disposing of dredged material in a way that satisfies legal requirements and environmental protection concerns. As Lee indicates, "what is needed is a procedure by which the potential significance of chemical contaminants in dredged sediments can be assessed *prior to* dredged material disposal." Implications for both water quality and ecological and biological integrity need to be evaluated.

Yet, the existing EPA guidelines under section 404 of P.L. 92-500 and the ocean dumping criteria under P.L. 92-532 fall far short of prescribing procedures for assuring that these environmental implications are addressed, much less addressed adequately. Thus, an "elutriate" test is provided for which, at most, tells one how much of various "major constituents" will be released from the dredge spoil into the water column over the relatively short term. As Smith notes, "benthic species can ingest contaminated sediment particles," and can become contaminated or poisoned without any escape of major constituents into the water at all. Furthermore, it is now well known that certain heavy metals (e.g., mercury, arsenic, lead, selenium, and tin) can be methylated into more soluble and more toxic forms in the environment as a result of biological activity. Such transformations would never be detected in any elutriate analysis. To add insult to injury, dredged or fill material may be excluded from even elutriate procedures if certain less-exacting qualitative requirements have been met.

To be sure, the kinds of bioassay and other characterization procedures necessary to adequately evaluate environmental consequences of dredge disposal often lie near the limits of the present state-of-the-art. However, there are "worst-case" assumptions that can be made to assure necessary protection to the environment. When the state-of-the-art improves, case-by-case evaluations may be more reliable and disposal restrictions can perhaps be lightened. The reverse approach—of applying loose restrictions until and unless state-of-the-art improvements indicate otherwise—will not protect the environment and is contrary to the law of the land.

We cannot agree with Lee that more field studies are the answer, at least for the foreseeable future. As was noted recently by a British scientist (*New Scientist*, April 29, 1976, pp 219–221): "Present survey strategies appear to be based on such inadequate theoretical frameworks that they cannot possibly interpret subtle environmental changes. An understanding of these effects will require detailed study of biological interactions over many years. Short-term, on-off "impact" statements or "base-line surveys" cannot be expected to provide an adequate framework for monitoring environmental changes."

We'd prefer to place our trust for the interim in laboratory and *in situ* bioassays, coupled with a healthy dash of respect for basic ecological principles.

Kenneth S. Kamlet, Counsel
National Wildlife Federation
Washington, D.C. 20036

Groundwater

Dear Sir: I read with much interest and great disappointment the article "Quality Assurance for Groundwater" (*ES&T*, March 1976, p 226).

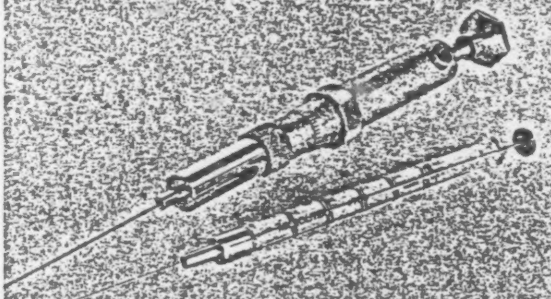
My interest in groundwater protection parallels much of what was expressed throughout the first half of the article: Certainly, groundwaters that lend themselves for public use need to be protected from pollutants and contaminants that may threaten human health. However, in the latter half of the article mention is made of human and animal wastes, and enteric viruses from human wastes being detected in groundwater supplies. Additionally, it was noted that "the major source of these viruses turned out to be leachates from *sanitary* landfills in which many disposable diapers containing untreated fecal matter had been buried".

There is much confusion and misunderstanding regarding land disposal sites. Unfortunately, many individuals fail to distinguish among the types of waste disposal sites—for example, dump, covered landfills, and engineered sanitary landfills. My disappointment and alarm stems from the fact that the author himself or the spokesman from the EPA Office of Water Supply implies that the disposable diapers containing untreated fecal matter gave rise to enteric viruses that resulted from leachates generated in a sanitary landfill site—with emphasis on the term "sanitary". I question whether the site was indeed a sanitary landfill site or whether it was an improperly operated waste disposal site. In the absence of clarification and with the emphasis on "sanitary" it almost seems as if the author is taking a "cheap shot" at sanitary landfilling—a necessary approach for effectively managing our discards.

NSWMA as the professional trade as-

EXHIBIT 10

Syringes for your carbon analyzer



We've designed two syringes to introduce samples into a carbonaceous analyzer. The special metal luer fits the inlet perfectly. Both are 50 μl capacities, one has a push-button action with spring-loaded plunger. Write for literature to Hamilton Company, P.O. Box 10030, Reno, Nevada 89510.

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CIRCLE 25 ON READER SERVICE CARD

EXHIBIT 11

ATTACHMENT B

OCEAN DUMPING ENVIRONMENTAL IMPACT DOCUMENTS

Dates in parentheses ( ) are dates specified in the NWF Stipulation

Description	Status (Interim: I, Final: F)	Schedule for Docu. Completion Draft*	Schedule for Docu. Completion Final	Est. Date for Final Designation	Under Court Stipulation Agreement (NWF)
Non-Dredged Material Disposal Sites					
1. 106 Mile Ocean Wastes Disposal Site, New York	I	6/25/79	2/27/80 (2/27/80)	10/81 (5/21/81)	yes
2. Acid Dumping Site, New York Bight	I F	11/27/79 (11/27/79)	12/1/80 (10/10/80)	10/81 Final desig. (6/16/81)	yes
3. North Atlantic Ocean Incineration Site	new	12/29/80	7/82	2/83	no
4. Cellar Dirt Dumping Site, New York Bight	I	3/82 (7/20/81)	7/82 (2/82)	2/83 (4/82)	yes
5. Philadelphia Sewage Sludge Dumping Site off Delaware Bay	terminated 12/80	8/81	12/81	final desig. not expected-study to assess impact	no
Dredged Material Disposal Sites					
6. Hawaii Dredged Materials Disposal Sites	* Ⓕ	10/20/79 (10/20/79)	9/30/80 (9/30/80)	designated (final) (Fed. Reg. 6/16/81)	yes
7. San Francisco Channel Bar Dredged Material Disposal Site	I	11/20/80 (10/10/80)	10/81 (5/11/81)	6/82 (7/13/81)	yes
8. Galveston Dredged Material Disposal Site	I	7/81 (12/10/80)	1/82 (12/29/80)	8/82 (9/81)	yes
9. Mouth of Columbia River Dredged Material Disposal Site	I	7/81 (2/5/81)	1/82 (9/81)	8/82 (11/81)	yes
10. Vieques Pass, P.R. Dredged Material Disposal Site	I	6/81 (12/20/80)	12/81 (7/81)	7/82 (9/81)	yes

Description	Status (Interim: I, Final: F)	Schedule for Docu. Completion Draft	Schedule for Docu. Completion Final	Est. Date for Final Designation	Under Court Stipulation Agreement (NWF)
11. Moss Landing Dredged Material Disposal Site	I	6/81	9/81	5/82	no
12. Nome Dredged Material Disposal Site	I	8/81	10/81	6/82	no
13. New York Dredged Material Disposal Site (Mud Dump)	I	10/81 (12/30/80)	2/82 (7/81)	9/82 (9/81)	yes
14. Portland, Maine Dredged Material Disposal Site	I	11/81 (3/9/81)	5/82 (10/81)	1/83 (12/81)	yes
15. Jacksonville Dredged Material Disposal Site	I	6/82 (5/6/81)	10/82 (12/81)	6/83 (2/82)	yes
16. Wilmington/Charleston/Savannah Dredged Material Disposal Site	I	6/82 (8/10/81)	10/82 (3/82)	6/83 (5/82)	yes
17. New Jersey/Long Island Inlets Dredged Material Disposal Site	I	6/82 (11/9/81)	10/82 (6/82)	6/83 (8/82)	yes
18. San Juan, P.R. Dredged Material Disposal Site	I	3/82 (12/17/81)	7/82 (7/82)	3/83 (9/82)	yes
19. Tampa Dredged Material Disposal Site	I	7/82 (6/27/81)	11/82 (1/82)	7/83 (3/83)	yes
20. Pensacola/Mobile/Gulfport Dredged Material Disposal Site	I	4/82 (1/6/82)	8/82 (8/82)	4/83 (10/82)	yes
21. Sabine-Neches Dredged Material Disposal Site	I	6/82 (9/4/81)	10/82 (11/81)	6/83 (1/82)	yes
22. Los Angeles/San Diego Dredged Material Disposal Site	I	8/82 (2/4/82)	12/82 (9/82)	8/83 (11/82)	yes

Description	Status (Interim: I, Final: F)	Schedule for Docu. Completion		Est. Date for Final Designation	Under Court Stipulation Agreement (NWF)
		Draft	Final		
23. Los Angeles/Long Beach Dredged Material Disposal Site	I	7/82 (10/19/81)	11/82 (5/82)	7/83 (7/82)	yes
24. Coos Bay Dredged Material Disposal Site	I	10/82 (6/7/82)	2/83 (1/83)	10/83 (3/83)	yes
25. Humboldt Bay Dredged Material Disposal Site	I	10/82 (5/5/82)	2/83 (12/82)	10/83 (2/83)	yes
26. San Francisco 100 Fathom Dredged Material Disposal Site	I	10/82 (4/14/82)	2/83 (11/82)	10/83 (1/83)	yes
27. Calcasieu Bar Dredged Material Disposal Site	I	4/83	6/83	1/84	no
28. Atchafalaya River Bar Dredged Material Disposal Site	I	1/83	5/83	2/84	no
29. Houma Navigation Canal Dredged Material Disposal Site	I	5/83	7/83	2/84	no
30. Barataria Bay Waterway Bar Dredged Material Disposal Site	I	4/83	6/83	1/84	no
31. Southwest Pass (Lower Jetty and Bar) Mississippi River Dredged Material Disposal Site	I	6/83	8/83	3/84	no
32. Mississippi River Gulf Outlet Dredged Material Disposal Site	I	5/83	7/83	2/84	no

Mr. **Scheuer**. Thank you very much, Mr. Kamlet.

Congressman Carney.

Mr. **Carney**. I have no questions, Mr. Chairman.

Mr. **Scheuer**. Congresswoman Schneider.

Mrs. **Schneider**. I hardly know where to begin here, considering we have such a series of diverse opinions.

Let me begin by asking Mr. Kamlet whether or not he is aware that the Puget Sound study is intended to be eliminated?

Mr. **Kamlet**. Yes, I am, along with the New York Bight project and the Hudson Raritan Estuary project and a number of others. I think that is a deplorable situation.

Mrs. **Schneider**. What type of actions would you recommend that this committee take in regard to that?

Mr. **Kamlet**. I certainly would like to see this subcommittee and committee recommend restoration of at least the prior funding level for those efforts on the part of NOAA, not allow any erosion of those valuable research efforts to occur.

Mrs. **Schneider**. Your testimony was in direct conflict with the remarks of Dr. Goldberg. You were suggesting that perhaps what we should do is store some of our toxic waste from 5 to 7 years on land, rather than in the ocean. If I understand your testimony correctly, Dr. Goldberg, I believe you said that we have a clear understanding of the plumes, the direction, and the activities of the ocean bodies. Is that correct?

Dr. **Goldberg**. No, not really. We have some understanding, sometimes detailed and sometimes fuzzy depending upon the site in its marine environment. My argument is that we can make a multimedia assessment for a given spot for a given waste today. One concern, and one that I am sorry my colleague, Mr. Kamlet, never addresses, is who is monitoring the subterranean waters which are endangered by land waste disposals.

I urge continued research by NOAA, EPA, and the academic community on the value of marine dumping. I think we need an even greater effort to look at what is happening to our land resources, such as potable water and the ecosystems. My colleagues in the environmental movement somehow curiously do not mention this need.

Thank you.

Mr. **Kamlet**. Mr. Kamlet would love the opportunity to react to that issue.

Mrs. **Schneider**. All right.

Mr. **Kamlet**. I think the key point that my friend and colleague, Dr. Goldberg, seems never to consider in this regard is that when we are talking about a comparison between waste disposal on land, in the ocean, or in any other medium, most of the concerns that one has is about keeping contaminants out of the water. On land it is ground water that is of concern or surface waters. In the ocean it is the ocean, and so forth. The point is when you dispose of something consciously in the ocean, you are putting it in water. Where you place the material on land, there is at least the opportunity to prevent it from entering ground water and contaminating ground water in the first place. I think that really is the key.

The opportunities for waste isolation and containment in the land environment are vastly better, vastly greater than they are in the marine environment. The experience that exists with sewage sludge management in particular over decades in the United States and over centuries in other countries demonstrates that even for contaminated sewage sludges it is possible to conduct a managed land application system without risk of significant contamination of either ground water or nearby surface waters. I do not think the same can be said for the ocean.

Mrs. SCHNEIDER. In considering the impact that many of man's uses might have on the oceans, what do you think poses the greatest threat? Might it be increased offshore oil exploration, as is planned for the east and west coasts? Might it be sewage? Would it be runoff from our land or our general ocean dumping procedures? Any one of you may answer.

Mr. KAMLET. I do not want to monopolize this, but I will begin inasmuch as there seem to be no other takers.

I think it is a cumulative problem. Ocean dumping per se probably does not account for more than 15 percent of the waste loadings to the coastal marine environment. Runoff from land represents a sizable contribution. Fallout from the atmosphere, oil spills out at sea and in coastal waters all contribute. Individually any given operation may make a small contribution, but the combined effect operates in a cumulative and adverse way. We need to control them and modulate them to the degree we can. Intentional waste disposal activities seem to be especially susceptible to intervention in that way and to control. We ought to do what we can wherever we can to control those kinds of waste inputs.

Mrs. SCHNEIDER. Dr. Goldberg.

Dr. GOLDBERG. I am going to agree with Ken. The pressing concern I have about pollution of the ocean relates to the long-term problem of eutrophication of coastal waters. We are introducing about 15 times more nitrate, about 5 times more phosphate, from the rivers into the ocean.

Mr. SCHEUER. Fifteen times more than what.

Dr. GOLDBERG. Than we have in the past 100 years. Over that 100-year period we have increased nitrate fluxes fifteenfold and phosphate fivefold from rivers to the ocean.

There is a general indication that there is a continuing and increasing eutrophication of coastal waters. On a long-term basis this could in principle result in a change in population of the flora where the diatoms, which are the food base for many commercial fish, might be replaced by the weeds of the sea, the denoflugeles. This is a concern which is not being looked at, in my mind, adequately by the marine science community.

Mr. SCHEUER. Take the New York Bight, which is the location of the most intensive ocean dumping activities of any coastal waters adjacent to America. I think they are doing a lot of coastal water dumping in England, and they seem to be studying it quite rigorously. In the case of the New York Bight, do you feel that is having untoward effects and that we are reaching or are close to reaching the absorptive capacity of the bight.

Mr. SCHEUER. You would have to factor in that Mr. Bascom's comment that somehow or other these marine organisms seem to be able to detoxify themselves. Is that true? If so, does that defer the day at which we are going to reach the maximum absorptive capacity or does it indefinitely extend the time during which we can safely dispose of our wastes in coastal waters?

Dr. **Goldberg**. The short-term problems of the assimilitive capacity of the New York Bight was addressed by 70 scientists at a meeting called Crystal Mountain Workshop about 2 years ago, sponsored by NOAA. The combined judgments of the 70 participating scientists was that the capacity of the New York Bight today was not being exceeded, either in impacts upon human health or upon the alteration of the marine community.

I was talking to a long-range problem, a much more difficult one to attack for a scientist where they may be very small changes over long periods of time. I cannot ascertain whether changes are taking place now to such an extent that we are going to lose resources, say, not in 5 years but in 80 years.

Mr. **Scheuer**. Let me ask another one. You have this very gradual accumulation. Can you chart ahead half a century or a century to when you will hit the danger point? Or is there a possibility or a danger that somewhere in the meantime you will hit a critical mass where even a slight addition would give you a catalytic process where you went from a fairly benign situation to one that was environmental unacceptable and dangerously toxic?

Dr. **Goldberg**. I cannot discount that possibility. The tragedy is there are so few researchers addressing this problem.

Mr. **Scheuer**. Would this be part of the cross-media study that we are talking about?

Dr. **Goldberg**. Yes; may I make just one more remark?

Mr. **Scheuer**. Yes, please continue.

Dr. **Goldberg**. We are also not looking at the long-term problems on land where we are having a slow leaching of land-disposed waste, whether they be sewage or industrial, to our subterranean waters. Here these effects may not be seen for 50 or 100 years but, if they do exist, we are going to lose a valuable resource.

Mrs. **Schneider**. Dr. Woodwell, I would appreciate it if you could please comment, based on your testimony—you were speaking of the Crystal Mountain report. Is your analysis similar to Dr. Goldberg's?

Dr. **Woodwell**. I certainly do not agree with his statement that the group agreed that the assimilative capacity of the New York Bight had not been exceeded. If you refer to the prepared testimony I advanced, I would read from that if I may one of the statements from that report.

Mrs. **Schneider**. Is this on page 8?

Dr. **Woodwell**. On page 4 at the bottom—or is it 8. I cannot read it. Should I read that?

Mr. **Scheuer**. If it is not too long.

Dr. **Woodwell**. I will read from the report. I must say that I cover this topic in additional detail, dealing especially with PCB's.

[The quotation which refers to the New York bight follows:]

> The strategies discussed in this chapter for determining the assimilative capacities of individual contaminants assume that the other contaminants present will not interact cumulatively to increase the biotic effects of the contaminants being evaluated. There is abundant laboratory and field evidence that combinations of contaminants do have cumulative effects and that reductionist approaches almost always underestimate ecological and public health effects.

Furthermore, it is clear from the analyses in this report and others that individual contaminants in the environment seldom appear to be concentrated enough to degrade the inner Bight ecosystem or to unduly toxify marine foods. Yet this ecosystem is severely degraded in several respects and modified in others, in response to cumulative effects of these same anthropogenic loadings.

Since the New York Bight is exposed to many pollutants simultaneously, it is expected that the available data on even two factor interactions understate the nonreality of single pollutant end points. The development of matrices for the interaction of all possible pairs of pollutants is an enormous research undertaking. The resolution of this problem requires an alternate strategy for controlling pollutant discharges and a research effort in supporting that strategy.

Mr. SCHEUER. We understand informally—we are getting signals from EPA informally—that they are going to recommend the 106-mile site for dumping. Would any of you have any reactions as to the maximally acceptable means of disposing of waste in New York City as between the 106-mile site and the 12-mile site, and as between the two of them, incineration and surface disposal. Would any of you have any off-the-cuff recommendations as to what would be the least environmentally degrading and the least health threatening—as between the two sites in the water and land disposal and incineration? That is really the nitty-gritty question with which we are wrestling.

Dr. WOODWELL. Let me say that I think the New York City problem is an almost unsolvable problem, unsolvable in any completely satisfactory way. The question you are posing is a very tough problem.

I do not believe that we are going to answer that, and it probably will not be answered in the Congress. It may be answered in the process of years of further research.

Mr. SCHEUER. I beg your pardon. We are going to have to answer this in the Congress. The question is, how long can we wait before the researchers come up with some hard data that will guide us, the results of this cross-media study? If you have any recommendations as to the design of such a study, we would be interested in hearing them and, undoubtedly, we would pass them along to EPA and NOAA, who are going to do it jointly.

Dr. GOLDBERG. The Crystal Mountain workshop concluded that dumpsite 106 was underutilized. It was estimated that it is today utilized to about 10 percent of its capacity with respect to industrial, chemical wastes, being discharged there.

My sense offhand would be, if the economics did not prohibit it, dumpsite 106 would be the least environmentally damaging area to put these wastes.

Mr. SCHEUER. At the present rate of increase and the amount of waste to be disposed of, how long can New York City reasonably figure that 106-mile dumping site, assuming that they can afford it—and they are going to have to afford—how long will that be an acceptable reservoir of New York City waste?

Mr. SCHEUER. Will it be 5 years, 50 years, or 300 years.

Dr. GOLDBERG. It will be time periods longer than that.

Mr. SCHEUER. Over a century?

Dr. GOLDBERG. Waste apparently totally disappears from the ability of science to detect it after 3 days.

Mr. SCHEUER. When you get to 1 part in 1 billion——

Dr. **Goldberg**. It is either going to England or going down to the Caribbean, or both, but it is being dispersed. [Laughter.]

Mr. **Scheuer** [continuing]. Following the familiar pattern of acid rain where the Ohio River Valley dumps its laundry in Canada and where England, France, Germany, Belgium, and Holland dump their dirty laundry in Scandinavia.

Dr. **Goldberg**. Mr. Chairman, with the exception that we can detect acid rain that has been transported over long distances, the dilution in the deep ocean is so great from the disposal of dumpsite 106, it will not be detectable at distances of hundreds of kilometers or only with great difficulty.

Mr. **Scheuer**. Then you are saying that we have a reasonably tolerable disposal system, at least on the eastern seaboard, if you can afford to take the stuff out 100 miles.

Dr. **Goldberg**. Yes; and this is documented in the Crystal Mountain report, sir.

Mr. **Scheuer**. Do you have anything to say about that?

Mr. **Bascom**. Do you defer, sir?

Mr. **Kamlet**. I defer.

Mr. **Bascom**. I would like to update or perhaps correct a few of the things that have been said recently before I get so many of them that I cannot remember them all.

First is the question of inputs, which you asked a bit ago. In California we have quite carefully measured the aerial fallout. We have measured the material coming out of the streams there. We have measured the harbor discharge—what flows in and out, with tides. All of these things.

Except for the sewage—the material is disposed through the municipal waste discharges—the others are essentially insignificant. We also can tell you in great detail what does come out of the municipal waste discharges. The other sources really do not amount to very much. I think it finally has gotten down to where the input from aerial fallout to the waters off California for DDT, even though DDT is no longer legal, are down to approximately a kilogram or two a year. It is a fairly small amount.

The second item had to do with the question about eutrophication. Eutrophication is a term which applies with some sense to small bodies of water—inland lakes, streams, and such as that. Except perhaps in some very restricted embayments, it is not a word that has much value in the ocean. There is no possibility of putting more nutrients in the ocean than the ocean can use. I do not remember anybody having suggested that.

Off California, one outfalls we do not ordinarily look at—it is one of Chevron Refining Co.—puts out a substantial amount of ammonia, which is the most obvious material that can be used by plants in the sea—diatoms and dinoflagellales. That has been tracked by a scientist for some time, I think without showing that there is anything close to eutrophication. If there are plenty of nutrients around the ocean can use them. It simply means more animals and more sea life grows. It certainly is not thought of as damaging by anyone with whom I ordinarily deal.

The question of whether dinoflagellales might replace diatoms is a subject which we have looked at off and on for some time. All phytoplankton are extremely difficult to measure in the sea. We have put a great deal of time in such studies and have never published because we can never come to anything conclusive about it.

Everyone who thinks about it is of the opinion that if you add additional nitrogen—principally ammonia but also other nitrates—to the sea, it must somehow help phytoplankton in some way. We have had estimates that it might increase the number in a very specific area by 10 percent. There are no good numbers on it anywhere, simply because of the spottiness of phytoplankton. I would be willing to bet you that you are not likely to find out the answer to that for a long time.

There are places where dinoflagellales do routinely live in our region. They happen not to be connected with outfalls. The one place where their increase is most pronounced is off of a specific creek which drains from a reserve swampland off the coast. The result is an increase in dinoflagellelas.

As for your question, sir, about whether we could forecast what would happen in 50 years at some specific place, that is a very sensible question. On the California coast, and I specify that place because I am quite secure in our knowledge about it, we have outfalls that have been operating essentially the way they are now for between 10 and 25 years. In all cases these reached a point of stability in a few years—I do not know how many, maybe 5 years or so—and from then on they simply have not changed very much. That is to say, the input and outgo appear to be equal at present.

There has been a buildup in the sediments—I mean buried well in the bottom—of certain kinds of contaminants. They do not appear to be affecting sea life, mainly because the contaminants are stuck to very tiny clay particles and are buried on the bottom. It does not look as though there is any likelihood they will ever come out. Eventually they will be carried off out to sea by some major storm and dropped on the deepsea bottom.

We do not see any changes there that would lead one to have the discouraging view that things are getting steadily worse every year, and gradually bottom sludge is going to expand and become a problem. We think that things are quite stable the way they are now.

Mrs. SCHNEIDER. Mr. Chairman, may I ask a question based on this at this moment?

Mr. SCHEUER. Yes; please go ahead.

Mrs. SCHNEIDER. It seems rather bizarre to me when one considers the daily development of new and different chemicals that are introduced into our society and into our environment, that you can anticipate this situation to, not only as you say be stable, but to continue to be stable, and as a scientist not recognize the accumulative or synergistic impact of all of these different new chemicals that are going into the oceans.

You say it does not appear to affect them. Might I just say that if one looks at the health impact of different pollutants and attempts to tie that to the development of cancer, unless you are living next to a fossil fuel plant and, you don't really make the connection of whether or not the pollutants coming from that source will have any impact on your health or not. But those health impacts do show up, perhaps as a result of accumulation of different polluants, 25 years later or 30 years later. And I think that my personal opinion is, as a person who is looking toward the future, that we certainly had better get this Congress out of this syndrome of crisis management, and the same thing applies to our research agencies and focus more on potential impact.

Mr. **Bascom**. Let me respond to that, please. What I said was that the discharges have been running between 10 and 25 years and they seem to have stabilized within about 5 years. Even with quite intensive looking, we have not been able to detect any substantial changes in recent years. Everything kind of goes up and down a little bit with long-range changes in the ocean.

As for the organic toxicants which you are concerned about, and I don't blame you for that, we quite routinely measure the wastes that come out of the outfalls out there. They are routinely subjected to this EPA list of priority pollutants, of which 113 of those items are toxic or allegedly toxic organic compounds.

We are able to detect about 20 of those that rise above the cutoff level EPA has set. Those cutoff levels are basically 10 parts per billion, and a few of them go down to 1 part per billion. We have recently done a study for NOAA of those organic contaminants. We have also found about 25 unidentified peaks which we are in process of running through a mass spectrometry to determine what they are. The first ones we found out turn out not to be serious.

What we have also done in this NOAA contract is to look at what are called organic aqueous partition coefficients, and which are roughly comparable to the lipid systems of animal bodies.

Mr. **Scheuer**. And in common jargon, that means——

Mr. **Bascom**. Well, all animals have a certain amount of fats which are called lipids in their bodies. Generally speaking these chlorinated hydrocarbons and organic toxicants tend to be deposited in those. So the question is, what is the ratio of concentration between fats and water? Based on those coefficients we can estimate toxicity. By the way, this turns out to work empirically as well as being a theoretical measurement. We have used toxicant data from the EPA—mainly done for white rats so it is not precisely the same as sea animals—and combined that with the partition coefficients and the concentrations in the outfall to obtain actual toxicity. It turns out that of all this great list of pollutants, of which there are roughly 20,000 in the computer bank you compare with, only about 10 make the slightest difference at all, because the combination of their concentration and of their actual toxicity is very tiny. We are recommending to the EPA that they reduce their long list to a much shorter list, but that they also reduce the measurement concentrations appropriately.

It turns out that, for example, pentachlorophenol could be highly toxic at a one-tenth of a part per billion. That is really worth looking at very carefully. Most of the rest on the list are so slightly toxic that they simply don't make any difference, certainly with present outputs levels.

So it is not as though we haven't thought through the matter as you discussed a moment ago.

Mr. **Scheuer**. Well, I am very concerned when you say this is not too serious. I would just like to quote something that you said in this NOAA report you are referring to, which was the annual report on the health of the Northeast coastal waters of the United States.

Mr. Bascom. Pardon me. I didn't refer to that report.

Mr. Scheuer. That wasn't the report when you said the report to NOAA?

Mr. Bascom. My group reported to NOAA on this question of organic toxicants in municipal waste material.

Mr. Scheuer. Well, let me ask you to comment on this in the 1981 NOAA annual report. It says fishery resources of the western North Atlantic are contaminated with petroleum hydrocarbons and PCB's. Species occurring over a wide range from the coastal waters of the New York Bight apex to the Outer Continental Shelf slope break showed unexpected high levels of these contaminants. And evidence points to a higher incidence of skeletal deformities, mutagenic aberrations, and various shell or skin lesions in organisms collected inshore and in and around dumpsites, strongly supporting evidence for deleterious effects of ocean dumping and coastal discharge.

Mr. Bascom. I have read that. Let me comment. First of all, I can't remember whether I said it here or elsewhere, but to redefine contamination, that word means you have got one more molecule of something that was there in normal circumstances. Is the area contaminated? Yes. Everything in the world is probably contaminated. There are probably unexpected molecules of something in this room which makes it contaminated. That is not pollution. Now, the question of whether it is doing any damage is quite another matter; I think perhaps that it is not. I did read that report and, as a matter of fact, my first question on reading it was, what were the control conditions against which they compared their data in order to say there were these skeletal deformities?

Well, our experience has been that, on the west coast again to make sure I am on fairly solid ground, is that all kinds of allegations like that are made. Unless you have very good control data you can't say there has been a change. We looked at tumors, when it was alleged that there were tumors around outfalls in California. That is certainly a true statement; roughly 3½ percent of the fish near Oatfalls have tumors in them. When we finally compared this with superclean areas in the Gulf of Alaska and the Bering Sea and other places, it turned out that there the same kind of fish had 5 percent tumors.

So what was said by NOAA may be correct. The question is whether it is worse than normal.

Mr. Scheuer. Congresswoman Schneider just asked unanimous consent that members be permitted to submit further questions in writing, and with there being no objection, so ordered. We will have some additional questions in writing. We have taken an hour and an half on this panel, which leaves us way behind schedule. It shows the degree of interest that you have stimulated up here, the degree to which we have found you very thoughtful and very creative. We thank you very, very much for your testimony, and you will be hearing from us with some additional questions.

Mr. Scheuer. We will now hear the next panel, Mr. Robert MacMillan of the New York State Department of Environmental Conservation, and Mr. Bruce Freeman of the Mid-Atlantic Marine

Fisheries Council, Trenton, N.J. Now, let me remind each of you that your testimony will be printed in full in the record. We are going to ask you, because the hour is running late and we have a panel following yours, to sum up your remarks to not more than 5 minutes. And that will leave us some time to ask you some questions.

So we will hear from you first, Mr. MacMillan.

STATEMENT OF ROBERT B. MacMILLAN, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, ALBANY, N.Y.

Mr. MacMillan. Good afternoon, Chairman Scheuer and members of the subcommittee. I am Robert MacMillan of the New York State Department of Environmental Conservation, and am reponsible for the management of the State's shellfish resources within the agency's division of marine resources, which in turn is responsible for the management of New York's total marine resources.

On behalf of Commissioner Flacke, I want to thank you for giving me the opportunity to appear before you today to address the Nation's needs for research into ocean pollution. As you know, New York's marine resources are of tremendous importance to the State's economy and to its environment.

We must both draw from the ocean and discharge into it, and it is crucial that we have the data we need to use this tremendous resource without damaging its productivity for future generations. We feel that the Federal Government is unquestionably the proper agency to gather this information. Beyond the 3-mile limit the Federal Government retains jurisdiction over the oceans. Impacts of dumping or other activities in the ocean beyond the immediate shoreline almost always touch more than one State.

Further, only the Federal Government possesses the resources for research in deep waters. Practically speaking, if marine research is left solely to the States, this critical research will not be carried out. New York has had a wide experience with ocean dumping. For more than 300 years wastes have been deposited in the New York Bight, and most or much of the waste has come from New York disposers.

We still remember vividly the events of 1976 when anoxic conditions developed in the New York Bight, with massive mortalities to marine life. And yet we know that ocean disposal of waste is likely to continue, and that the New York Bight is a logical site for such disposal. With this in mind, we cannot sufficiently emphasize the need to continue environmental monitoring. If routine monitoring is terminated, we are left without a starting point in the event of a problem such as the 1976 anoxia. And once that develops and once monitoring continuity is broken, valuable information already gathered will be wasted.

This long history of intense use makes the New York Bight an ideal subject for ocean disposal studies. The National Oceanographic and Atmospheric Administration has carried out in the bight a highly productive research project known as MESA which investigates the effects of ocean dumping. In addition, the U.S. Environmental Protection Agency has initiated routine monitoring of ocean waters in the bight. Both of these sources have provided useful data for New York's oversight of its marine resources and evaluation of disposal alternatives.

I note with regret the President's fiscal year 1983 budget calls for the phasing out of NOAA's research on ocean disposal in the marine environment on the premise that all necessary research in this area has been or will soon be completed. We disagree with this assumption. While NOAA has obtained and distributed much useful data during the 10 years of MESA, important questions about ocean dumping remain to be answered. Both basic research and ongoing monitoring are needed to reveal the answers

We feel we do need a thorough comparison of the effects of nearshore and offshore disposals of wastes. For the long term we have an obligation to explore and monitor the effects of ocean dumping, to insure that we are not inflicting irrevocable damage on a resource needed by future generations. But in the short term, New York and other coastal States are daily faced with disposal decisions which demand that ocean dumping be critically evaluated as one of several alternatives. To carry out this responsibility the States need data on ocean ecosystems which is of comparable reliability and detail to the detail they gather on land, air and inland water resources.

As I have already noted, most States' research capabilities simply do not extend to the deep-water research. Another agency must be available to supply this data. It does matter very much to industries and municipalities located along the shoreline that we make this decision and evaluation properly. For them, the choice lies between greater and lesser levels of treatment for discharged effluent, between hauling wastes far out into the ocean or dumping them closer to shore. If we have sufficient information we can choose the least expensive alternative that will meet our environmental goals and see to it that environmental protection resources are directed where they will do the most good. The cost of gathering data could be offset many times over by savings to disposers.

Yet, another aspect of the States' need for data for present decisions is found in the general question of how to best dispose of a growing quantity of sewage sludge we produce. The events of 1976 made it seem that ocean disposal was a bad approach to sludge disposal, and so the Congress moved toward eliminating ocean dumping. Since that time we have learned that incineration, land spreading, and other disposal approaches can also create problems. Somehow we must obtain enough information and the right information to weigh the effects of all types of disposal and choose the best approach for each situation. We at DEC have made use of the MESA data in evaluating sludge-disposal options and alternatives, but we need more information, either from the continuation of existing research or from a redirection——

Mr. SCHEUER. Mr. MacMillan, we have asked you to summarize. You have already submitted it and it is going to be printed in the record. Can't you sum it up for us in another minute or two? We are pressed for time.

Mr. MACMILLAN. One issue I would like to address deals with alternate sources of funding, The statement does reflect on the concept of user fees, recognizing that funding is becoming critical at both the Federal and State level. Cost sharing by all parties involved in the ocean disposal of waste offers a means to generate revenue that could provide the funds required to support research and environmental monitoring. I involved parties would include, but not be limited to, private industry or governmental agencies generating the waste and respective State and governmental agencies involved in permitting the discharge of the materials at the designated dumpsites. An agency in the Federal Government could administer the distribution of the funds.

Mr. SCHEUER. We are very much intrigued with that idea, and Mr. Freeman is advocating pretty much the same thing. When he gets finished with his testimony we will have a few questions to ask you on the specifics of how that will be organized.

All right, Mr. Freeman.

STATEMENT OF BRUCE L. FREEMAN, MID-ATLANTIC FISHERY MANAGEMENT COUNCIL, TRENTON, N.J.

Mr. FREEMAN. Thank you, Mr. Chairman. I had prepared a statement, but because of the limited time we have, I will not read it. Interestingly enough, and I had no contact with New York, the parallels between my statement and New York's are very, very similar. I am here representing the Mid-Atlantic Fishery Management Council, which is a council set up by Congress in 1976 to develop management plans for the wise use of our fishery resources. This council represents the geographic area of New York, New Jersey, Delaware, Pennsylvania, Maryland, and Virginia.

There are several points I would like to make and to summarize my short testimony. The Council supports the continuing research, but we feel that it should be increased and not decreased. In my position, I am the Administrator for Marine Fisheries for the State of New Jersey, I deal in crisis situations every day, and many of the problems I am confronted with are attributed to the pollution that occurs primarily off New York City and off northern New Jersey. We certainly have one of the most heavily impacted areas, and I am talking from experience, problems we are faced with today—it is not a hypothetical or an academic discussion.

Some of the problems that we experience are because of the needed research that we don't have. We don't have the answers. We are seeing that there are many shortcomings. One of these is that we are not looking at the long-term effects of these various pollutants on our marine animals. It was brought up in the questioning before about the ichthyoplankton in relation to the dumping of waste. We had looked at various fish larvae along the entire east coast of the United States and compared those with the various ichthyoplankton in the apex of the New York Bight. Those in the bight apex had a substantial increase in the amount of deformities of their backbones and other bony structures, which rendered these organisms unable to compete for food as you would expect. Other studies conducted by Fish and Wildlife Service particularly related to striped bass, seemed to demonstrate a very high amount of deformities. Also, the hatching rate seems to be much lower than you would expect. Preliminary results indicate that it seems to be related to various toxic substances found within the water.

So I think there is certainly indications we need to look at these factors. Some of these biological difficulties are insidious in that we do not have the answers immediately, but the defects may be far reaching. The behavioral patterns of various organisms can be changed. We have seen this happen already in some of the dredge spoil disposal areas off the New York area.

We had also proposed quite independently from New York, a source of funding for research funds. Obviously in this day and age funding is becoming very difficult. The Federal Government has primarily been the sponsor of research in ocean pollution. We feel that there should be a mitigation fund set up. One of the problems we find in ocean dumping is that it is quite inexpensive compared to other means of disposal. We feel that the difference between the price for ocean dumping and that which could properly be done on land be put into a fund to sponsor the needed research. Also, we feel that this money could be spent for habitat development.

Primarily there are the points that are included in my testimony. I would be very happy to answer any questions you may have.

[The prepared statement of Mr. Freeman follows:]

PREPARED STATEMENT OF BRUCE L. FREEMAN

GOOD AFTERNOON. REPRESENTATIVE SCHEUER, OTHER DISTINGUISHED MEMBERS OF THE SUBCOMMITTEE, GUESTS AND FRIENDS, MY NAME IS BRUCE L. FREEMAN. I AM HERE TODAY REPRESENTING THE MID-ATLANTIC FISHERY MANAGEMENT COUNCIL. WE ARE ONE OF EIGHT REGIONAL FISHERY MANAGEMENT COUNCILS CREATED BY PUBLIC LAW TO PREPARE FISHERY MANAGEMENT PLANS FOR THE WISE USE OF OUR FISHERY RESOURCES OCCURRING FROM THREE TO 200 MILES OFF OUR COAST. THE MID-ATLANTIC COUNCIL'S GEOGRAPHIC AREA OF AUTHORITY INCLUDES THE WATERS OFF THE STATES OF NEW YORK, NEW JERSEY, DELAWARE, PENNSYLVANIA, MARYLAND AND VIRGINIA.

IT IS A GIVEN FACT THAT THE DISPOSAL OF POLLUTANTS IN THE SEA HAS BEEN A COMMON PRACTICE THROUGHOUT THE WORLD. THIS PRACTICE IS ESPECIALLY COMMON OFF THE COAST OF HIGHLY INDUSTRIALIZED NATIONS, PARTICULARLY THE UNITED STATES. UNFORTUNATELY, THE TREND IS TO INCREASE THE AMOUNT OF POLLUTANT DISPOSAL IN OUR OCEANS. IN ADDITION TO THIS, WE FIND ALL TO OFTEN THAT MANY OF THOSE DISPOSING OF POLLUTANTS SHOW NO GENUINE INTEREST OR CONCERN FOR THE IMPACTS OF THEIR DISPOSAL ACTIVITIES. THEY ARE NOT CONCERNED WITH THE LIVING MARINE RESOURCES OF THE SEA, NOR WITH THE PEOPLE WHO ULTIMATELY FEED UPON THESE RESOURCES. I TRULY HOPE THAT THIS SUBCOMMITTEE AND THAT THIS CONGRESS WILL NOT PERMIT THIS ATTITUDE TO PERSIST.

THE METROPOLITAN NEW YORK-NEW JERSEY AREA HAS THE DISTINCTION OF HAVING MORE WASTE MATERIALS DUMPED OFF ITS COAST THAN ANY OTHER COMPARABLE AREA ON THE EAST OR WEST COASTS. THESE DUMP SITES ARE LOCATED ONLY FROM 6 TO 15 MILES OFF OUR SHORE AND WITHIN THE CENTER OF PRODUCTIVE NEARSHORE FISHING GROUNDS THAT ARE UTILIZED BY VARIOUS SPORT AND COMMERCIAL FISHERMEN. THESE DUMP SITES ARE USED FOR THE DISPOSAL OF CONTAMINATED DREDGED SPOIL, SEWAGE SLUDGE AND A WIDE VARIETY OF INDUSTRIAL CHEMICAL WASTES. ALL OF THESE ARE CONTAMINATED TO SOME DEGREE WITH HEAVY METALS, PCB'S, PETROLEUM HYDROCARBONS AND OTHER HAZARDOUS MATERIALS WHICH HAVE BEEN DEMONSTRATED TO HAVE ADVERSE IMPACTS UPON MANY MARINE ORGANISMS. AS A RESULT, OUT COASTAL RESOURCES THAT ARE UTILIZED FOR FOOD AND RECREATION ARE BEING THREATENED.

VARIOUS FISHERY RESOURCE AGENCIES HAVE OFTEN ADVOCATED THE RELOCATION OF THESE DUMP SITES FURTHER OFF OUR SHORES, AWAY FROM POPULAR FISHING GROUNDS AND SEGREGATED FROM ONE ANOTHER SO THAT THEIR IMPACTS CAN BE PROPERLY EVALUATED. ALTHOUGH THE NEW YORK BIGHT APEX HAS VERY HIGH CONCENTRATIONS OF HEAVY METALS FOUND IN ITS SEDIMENTS, CONTAMINATION BY ANY ONE SOURCE HAS BEEN IMPOSSIBLE TO DETECT DUE TO THE CLOSE PROXIMITIES OF THE SEVERAL DUMP SITES AND BECAUSE OF THE MASKING AFFECTS BY WATER FLOWING OUT OF THE HUDSON-RARITAN RIVER SYSTEMS.

THE ENVIRONMENTAL PROTECTION AGENCY (EPA) HAS CONTINUED TO ISSUE OCEAN DUMPING PERMITS FOR CONTAMINATED DREDGE MATERIALS, SEWAGE SLUDGE AND INDUSTRIAL CHEMICAL WASTES BEYOND THE 1981 DEADLINE ON THE BASIS OF UNAVAILABILITY OF ALTERNATE DISPOSAL METHODS AND ECONOMIC NEED. THE GROWING PUBLIC AWARENESS AND CONCERN TOWARD OCEAN DUMPING SHOULD MANDATE THAT WASTE DISPOSAL ACTIVITIES BE SCRUTINIZED CLOSELY AND PROPERLY TO ASSURE THAT LONG-TERM DEGRADATION DOES NOT IMPACT UPON THE MARINE RESOURCES. THIS WILL REQUIRE MUCH MORE RESEARCH EFFORT THAN IS NOW TAKING PLACE.

UNTIL NOW FEDERAL, STATE AND LOCAL FUNDS HAVE SUPPORTED RESEARCH THAT WAS AND IS NEEDED TO DETERMINE THE EFFECTS OF OCEAN POLLUTION. WHILE RESEARCH HAS BEEN IN PROGRESS FOR AT LEAST HALF A CENTURY, STILL MANY QUESTIONS REMAIN UNANSWERED. IN FACT, IF ONE CONTRASTS TODAY WITH 10 YEARS AGO, HE WOULD FIND THAT DESPITE A DECADE OF RESERCH FINDINGS, THE PROBLEMS HAVE MAGNIFIED AND MORE WORK NEEDS TO BE DONE TODAY.

BECAUSE OF FUNDING LIMITATIONS, ONE OF THE SHORTCOMINGS OF THE PRESENT RESEARCH IS THAT IT CONCENTRATES ON WHETHER CONTAMINATED ORGANISMS PASS TOXINS DERIVED FROM OCEAN DISCHARGES ON TO MAN. OFTEN, THEY DO NOT INVESTIGATE WHETHER SUCH TOXINS OR CONTAMINANTS WILL PERMANENTLY EFFECT THE ORGANISMS THEMSELVES, EITHER DIRECTLY OR INDIRECTLY, AND WHETHER IT WILL BE PASSED ON ALONG THE FOOD CHAIN. RESEARCH HAS BEEN LACKING ON THE LONG-TERM EFFECT UPON THE VARIOUS MARINE ORGANISMS. RECENT STUDIES HAVE SHOWN THAT SEVERAL SPECIES OF FISHES COMMON TO THE MIDDLE ATLANTIC AREA SHOW GENETIC DAMAGE OR ABERRATIONS THAT CAN BE TRACKED TO POLLUTED WATER. IS THIS TRUE OF ALL OUR FISH SPECIES? CAN THIS OCCUR IN MAN AS WELL?

WE FEEL THAT THE OCEAN BIOCHEMICAL MONITORING REQUIRES MORE FUNDING IN ORDER TO STUDY SUBLETHAL RESPONSES FROM CONTAMINANT TRANSFER RELATED TO OCEAN DISPOSAL. A MORE AMBITIOUS PROGRAM SHOULD BE DEVELOPED TO APPLY TECHNIQUES FROM OTHER FIELDS OF SCIENCE INCLUDING GENETICS AND MICROBIOLOGY. I SEE THE OPPORTUNITIES FOR THE STATE GOVERNMENT AND EDUCATIONAL INSTITUTIONS, IN ADDITION TO THE FEDERAL AGENCIES, BEING ABLE TO CONDUCT THE FIELD RESERACH ONCE A SUITABLE PROGRAM IS DEVELOPED.

ADDITIONAL RESEARCH IS NEEDED IN ORDER TO DETERMINE THE EFFECTS THAT OCCUR IN MIGRATORY FISHES WHICH MAY LINGER IN CONTAMINATED WATER FOR PART OF ITS TIME, THEN MOVE TO OTHER AREAS. DO THESE FISH RETAIN THE CONTAMINANTS OR DO THEY GRADUALLY RID THEMSELVES OF THESE? FOR EXAMPLE, WILL BLUEFISH THAT SPEND THEIR FIRST YEAR OF LIFE IN A CONTAMINATED ESTUARY CONTINUE TO HARBOR TOXIC SUBSTANCES THROUGHOUT LIFE? WILL THE SAME FACTORS THAT EFFECT BLUEFISH EFFECT STRIPED BASS

IN THE SAME MANNER? WILL THEY EFFECT ALL MARINE FISHES THE SAME?

WITH REGARDS TO FUTURE OCEAN RESEARCH, I SUGGEST AN INTERTWINING OF ROLES BETWEEN FEDERAL GOVERNMENT, STATE GOVERNMENT AND INDUSTRY. THE PRESENT SYSTEM MAKES IT PROFITABLE FOR MUNICIPALITIES AND INDUSTRIES TO DISPOSE OF THEIR WASTE IN THE OCEAN INSTEAD OF PROPER TREATMENT. I DO NOT FEEL THAT ANY AGENCY OR INDUSTRY SHOULD REALIZE PROFITS BECAUSE A LAND-BASED TREATMENT ALTERNATIVE IS JUDGED MORE EXPENSIVE. I RECOMMEND THAT THE FEDERAL GOVERNMENT DEVELOP A MITIGATION FUND BY CHARGING THOSE WHO WISH TO DISPOSE OF THEIR WASTES IN THE OCEAN. THE OCEAN DUMPERS SHOULD CONTRIBUTE ANY PROFITS THEY MAY REALIZE BY OCEAN DUMPING THEIR WASTES IN LIEU OF A LAND-BASED TREATMENT ALTERNATIVE. SUCH A MITIGATION FUND WOULD THEN BE UTILIZED BY THE STATE AND FEDERAL GOVERNMENTS TO FUND THE NEEDED POLLUTION RESEARCH FOR MARINE HABITAT ENHANCEMENT PROJECTS.

THE MID-ATLANTIC COUNCIL COMMENTS THE SUBCOMMITTEE FOR ITS INTEREST IN OCEAN POLLUTION RESEARCH. WE TRUST THAT OUR COMMENTS ARE HELPFUL AND WE STAND READY TO BE OF ASSISTANCE TO YOU OR YOUR STAFF IN ANY WAY. THANK YOU.

Mr. **SCHEUER**. Thank you very much. Mrs. Schneider.

Mrs. **SCHNEIDER**. The one question that keeps coming to mind is, Mr. Freeman, you suggest that we increase research. This committee has been hearing a number of different testimonies in the past week from various panels about how we need to increase research. I assume you are probably aware of the proposals for budget cuts in the EPA and NOAA. Just out of curiosity, has your association or your State made any communications whatsoever to the Congress or the administration as to your arguments for maintaining level funding for research?

Mr. **FREEMAN**. Well, in relation to that question I can answer that the Mid-Atlantic Council is very much concerned. We have not, but certainly it could easily be done.

Mrs. **SCHNEIDER**. This panel will certainly be in the position of making recommendations. It seems to me there is some question as to the value of research, but I think that many of us who sit on this committee and hear the testimony are aware of it. Some of our colleagues and some of the other Representatives would surely benefit from your specific input.

Mr. **FREEMAN**. May I make a comment on that.

Mrs. **SCHNEIDER**. Yes.

Mr. **FREEMAN**. It is sort of ironic in that Congress has set aside a considerable amount of money for the councils, and these councils throughout the country try to optimize our use of fishery resources. We have the mid-Atlantic area where there is a great amount of destruction of those resources or even the rendering of those resources not usable because of various types of pollution. This is particularly true in the apex area where very important resources, such as surf clams and ocean quohogs, are not usable because they are contaminated. On the one hand we are trying to increase the viability of our commercial fisheries and our recreational fisheries, and on the other hand we are simply destroying it with the disposal of a waste product. It is diametrically opposed.

Mrs. **Schneider**. It is not the first time we have run into that problem here. Would you please answer the question as to what kind of monitoring is currently being done to check out the status of the area's ocean resources and if there has been any seafood caught in your State's waters or in the mid-Atlantic area that you are familiar with, that contain toxic chemicals?

Mr. **Scheuer**. And which constitute a threat to human health, because some level of toxic chemicals may be benign. The question is, is human health threatened?

Mr. **MacMillan**. The New York State Department of Environmental Conservation has restricted the taking of fish for human consumption in a portion of the Hudson River due to elevated concentrations of PCB's detected in fish samples taken from those waters. Closures, restricting the taking of shellfish also exist within New York State's territorial sea. There is evidence to suggest that this closure, in part, is related to the dumping of sludge wastes in the New York Bight at the designated sludge dumpsite. Furthermore, there is an additional 210-square-mile shellfish closure instituted by the Federal Food and Drug Administration restricting the taking of shellfish from those waters.

Mrs. **Schneider**. Are you familiar at all with the level of enforcement that exists?

Mr. **MacMillan**. Yes, a very low level of enforcement exists in these areas.

Mrs. **Schneider**. So that despite the fact that there may be a mandate for closure, the general public or different seafaring industries might not necessarily be adhering to those restrictions?

Mr. **MacMillan**. To the best of my knowledge, New York's sea clam industry is aware of the shellfish closures referenced above and does not take shellfish from the restricted areas. Enforcement is provided by both local and State agencies and at the Federal level, the U.S. Coast Guard is involved in monitoring activities in the 210-square-mile shellfish closure.

Mrs. **Schneider**. The Coast Guard?

Mr. **MacMillan**. Yes; that is correct. At the present time enforcement may be considered adequate relative to the shellfish closures in the apex of the New York bight.

Mr. **Freeman**. May I add, certainly New York and it appears that New Jersey as well, have various crustaceans, primarily blue crabs, with high levels of cadmium. There has been a health warning put out by the Department of Health for the State of New York, particularly in the Hudson River. It appears that this problem may be more severe than we originally were aware of.

We are also looking at the possibility of contamination of another crustacean which is important to New Jersey and New York, the American lobster, where the cadmium is a problem. It relates to the kidneys in humans; high amounts of cadmium have serious effects upon human health. These problems exist. We are not talking from a hypothetical standpoint, we are dealing with them every day and they are very serious problems, and the more we look at these the more frightening it becomes.

Mrs. **Schneider**. I am well aware of that. In the State of Rhode Island our own Narragansett Bay is often closed to shellfishing regularly, and the fishermen need to live. They need to survive. Therefore they will go after the shellfish there and sell them even though they may not be aware of the tremendous health danger that may exist. It certainly is a problem.

Mr. MacMillan. The same problem faces New York State and its shellfish industry. I would also like to note another problem involving levels of hazardous wastes that has not been addressed related to the "action levels" or "guidelines" established for certain substances. For example, New York has authorized the taking of shellfish from a specific area in Raritan Bay. An inital question dealt with the levels of metals in the shellfish. Samples of shellfish were collected and analyzed for a series of metals including cadmium, chromium, lead, and mercury. The question then arose as to what the levels indicated relative to public health. In this situation, the State looked to the Federal Government for guidance. However, there are no standards except for mercury. I understood Mr. Bascom, of the previous panel, to state that his group had examined a list of contaminants and concluded that some limits or standards were probably too high. If more work could be done in this area, it may be possible to develop standards that would permit the dumping of certain materials that are considered hazardous based on insufficient data. This could result in significant cost savings to industry and governmental agencies if certain materials could safely be discharged at current discharge sites with no adverse impact on the marine environment

The question of acceptable water quality standards as it relates to shellfish sanitation and public health protection is one that should be reexamined. Such reexamination could lead to a new standard that would allow taking of shellfish from waters currently closed and still protect public health.

Mrs. Schneider. Thank you very much. I have no further questions.

Mr. Scheuer. Thank you very much. This has been a very stimulating and thoughtful panel, and we may have some additional questions which we will put to you in writing.

At this time I would like to turn the chair over to Congresswoman Schneider to chair the last panel.

Mrs. Schneider. Thank you, sir.

Now if we could have Dr. Eugene Cronin please come forward and Dr. Marlene Evans. Dr. Cronin is with the Chesapeake Research Consortium, from Shady Side, Md., and Dr. Evans is the president of the International Association for Great Lakes Research from Ann Arbor, Mich. Welcome to you both. If I might take the example set by the chairman, would you please summarize in 5 minutes. We will leave the record open for you to put in the testimony that you have submitted in its entirety. So, Dr. Cronin, would you like to begin?

STATEMENT OF DR. EUGENE CRONIN, CHESAPEAKE RESEARCH CONSORTIUM, SHADY SIDE, MD.

Dr. Cronin. Thank you, Madam Chairman. I respect your time. I will see how much I can compact into 5 minutes and respond to any questions you wish.

I am here representing the the Estuarine Research Federation, which is a federation of about 1,900 people around the coasts of the country who are interested in learning about estuaries. My comments this afternoon will be directed toward the estuaries, which are not part of the open ocean but are included in the legislation and are an extraordinarily important part of the human environment.

I won't add to what is in my formal statement about my background except to note that it goes back to about 1940 and has been devoted entirely to the study of estuaries.

The 850 estuaries of the Nation are, in proportion to their size, the most valuable portion of the marine environment, and I provided detail in my statement to document that in a number of different ways. We don't know the full value, but we know it is extraordinarily high, and higher than any part of the open ocean.

Second, the estuaries are the most threatened part of the marine environment, and the principal threat is pollution. Their position is at the foot of all the hills, at the end of the line, as the collectors of everything that comes out of the cities and off the land which makes them an exceptionally vulnerable place.

Third, the estuaries are the most complex portion of the marine environment. You have heard comment about the difficulties and progress in studying the ocean. It is far more difficult to study an estuary, which is continuously and drastically changing and which has in it complex cycles that are beyond or almost beyond the present capability of our computers and our systems analysis.

Fourth, the estuaries are poorly studied. There is a large volume of information from the University of Rhode Island, and from many other laboratories around the coast, because every State has some research going on. I would like to add to my printed record, Madam Chairman, some copies of a recent article on a perspective on estuarine and coastal research funding which I think the committee might find of interest, and I will refer to that several times.

Fifth, the estuaries are poorly studied because, most of the research has been directed toward the simpler problems, the single-discipline problems. Very little of it has gone to the critically important and complex problems.

Sixth, effective management for highest economic yield depends on adequate understanding. We cannot manage these highly used systems beyond the level of our knowledge of them, and I think that the case is presented for that argument and may help make it convincing.

Seventh, such comprehension comes from research. That is how we build the bank account of knowledge to which we go when a problem comes up.

And eighth, we conclude that there is critical need for increased, sustained and redirected research on estuarine pollution to protect and enhance the high value of the bays and harbors, not because we are interested in research—but because of our certainty that such research will pay exceptionally high dividends in protecting and enhancing the values and economic benefit to the coastal region.

On the specific questions offered, Madam Chairman, I would like to make these responses.

We think the state of the art of estuarine pollution research is grossly insufficient. We cannot transfer the fine laboratory work that is done many places to the estuaries to provide more than a very coarse estimate of what is going to happen out there. We cannot predict the real effects of any pollutant proposed for release into the estuary. Because of funding limitations we cannot undertake the essential complex research on multidisciplinary problems, which is the only way we are going to solve some of the pollution-related questions.

The need for such research is critical. Coastal populations are expanding very rapidly. I have an attachment, Madam Chairman, that shows the expansion we expect to see around Chesapeake Bay by the year 2020, and it is frightening. Uses are intensifying and they are conflicting. New chemicals are created and our knowledge base is not yet sufficient to deal with the related problems. You asked about the opportunities for effective research. As far as estuaries are concerned, the opportunities are excellent. There are Federal laboratories with well-equipped facilities and experienced and qualified scientists. Every one of the States supports related research and has laboratories which can be effective partners.

The academic community is very large and it is available for this kind of research. Consortia like the one I work for and other mechanisms exist which can pool facilities and scientific capabilities. And the Estuarine Research Federation is available as a relatively new organization to complement Government programs with review, advisory assistance and in any other way you wish.

You asked about the distribution of responsibilities for estuarine research. We think the Federal Government must be substantially involved because pollution arises throughout the watershed, not just at the coast, because some kinds of research require large-scale funding and approach, because research has nationwide application, and because the establishment of national limits is essential for multi-State guidance. The Federal roles, therefore, are coordination, funding to an appropriate degree, providing quality control and conducting the research to establish national guidelines.

The States also have an important role, because they are the managers of pollution within their territories. Their principal roles appear to be fund research on the problems which are local and site-specific, and to establish appropriate regulations and enforce them based on national information and within national limits. They cannot be fully sufficient because they receive much of their pollution burden from upstream States or from the ocean.

Industry will do what makes a profit. That means proprietary research, whatever additional research the law requires. It is not fair or reasonable to expect them to do more than that.

The academic community, where most of the scientists participating in fundamental research exist, can advise on the basic studies which will be of greatest value, can conduct both complex and more limited studies on fundamental processes, and can develop predictions of pollution effects.

You asked about the quality of Government research in ocean pollution. Briefly, we think it is mixed. We see an excellent example in some of the EPA laboratories and some of the NOAA laboratories. We have also seen bureaucratic complexity and an impression of more management and more discussion going on than productive research, in some cases. We think such laboratories are critically important. We do think they can be improved.

I would note that the Government seems to be moving away from the profitable investments in academic institutions that were made in past decades. This paper that I am adding to my testimony points out that 77 percent of the refered, that is the scientifically approved, publications on estuaries came from academic faculty, only 15 percent from Federal laboratories and 8 percent from all other sources. But if you look at the use of Federal funds, it indicates that only 37 percent of the Federal funds go to the academic community. Academia is capable of a great deal, but receives only a small portion of the Federal funds now being used, and that would even shrink further, of course, under the proposed budgetary limits.

You asked about how can we make cross-media assessments, and we suggest a two-step program. Attract the best set of brains we have in Government and academia, lay out a design to fund and accomplish two basic steps. You must be able to predict effects on the air, the land, and the water. This will require excellent research. Then you can combine them and make cross-media assessment. We have heard testimony today that said we may not now be able to do any of them sufficiently. That is a powerful argument for continued research in all of these simultaneously.

We have no basis for comment on the effect of the National Institution Planning Act on coordination. We know that related activities have produced some very important summaries and a national plan, now under revision. These are very constructive steps. Whether they provide sufficient coordination or not we cannot judge.

In summary, we believe it is of critical national importance that estuaries be protected from pollution damage and maintained in productive good health. They can serve extraordinarily high values for the indefinite future with proportionate growing economic return. We recommend adequate and appropriate research be conducted so that management knows and applies the capacities and limits of estuaries for pollutants.

The only two alternatives we see are, A, to protect them by extreme restrictions, which is costly, or B, to risk massive losses in fisheries, recreation, shoreline values and other economically important uses. And that is even more costly. These alternatives are far more expensive than learning and managing carefully.

The Federation offers its assistance in any way we can be helpful. Thank you.

[The prepared statement of Mr. Cronin follows:]

PREPARED STATEMENT OF L. EUGENE CRONIN

Mr. Chairman and Members of the Subcommittee:

I appreciate this opportunity to present comment on behalf of the 1900 members of the Estuarine Research Federation, a confederation of research organizations on the coasts of the nation. It includes the New England Estuarine Research Society, Atlantic Estuarine Research Society, South Eastern Estuarine Research Society, Gulf Estuarine Research Society and Pacific Estuarine Research Society. Alaska, Hawaii and the territories may join later, since they too have valuable and troubled estuaries.

The Estuarine Research Federation exists to bring together those interested in learning about coastal waters, providing biennial international conferences on estuarine research, and providing information and assistance in governmental consideration of estuarine and coastal matters. This testimony is provided at the request of Dr. Barbara Welsh, President.

As an individual, I have studied and watched estuaries since 1940, as student, scientist, science administrator and citizen. Professionally, I have conducted research on crabs, fish, oysters, pollution and the effects of man on some of these extraordinary and valuable treasures - the 850 estuaries of the nation. I directed the Chesapeake Biological Laboratory of the University of Maryland for 20 years, began the marine science program of the University of Delaware, and now direct a Consortium of The Johns Hopkins University, University of Maryland, Smithsonian Institution and the Virginia Institute of Marine Science of the College of William and Mary. I do not, however, speak today formally for the Trustees and institutions of the Consortium. There has not been time to review this statement with them.

In professional organizations, I am past president of the Atlantic Estuarine Research Society, National Shellfisheries Association and Estuarine Research Federation. I serve the Federation now as Chairman of the Advisory Committee of Past Presidents. My experience with estuaries and coastal systems includes a period in Europe as Liaison Scientest for the U. S. Office of Naval Research, service on panels of the National Academy of Sciences (present Co-Chairman of the Panel on Estuarine Research), consultant to the U. S. Army Corps of Engineers, State of Maryland and other entities. I have published a number of reports and formal publications - all concerned with estuaries and their relationships to human use and welfare.

With recognition that the Subcommittee is devoting attention to four specific legislative actions related to ocean pollution research, we respectfully submit the following comments, with primary emphasis on the estuaries of the nation:

1. The 850 estuaries of the nation are, in proportion to their size, the most valuable portion of the marine environment.

   These semi-enclosed mixtures of fresh and salt water are the ports for billions of tons of commercial shipping, valuable residential sites for millions of persons, useful for hundreds of millions of visitor days in many forms of recreation, extensively employed to cool electricity generating plants and widely employed by defense agencies. They are useful, within limits, as receiving sites for wastes. Most especially, they are essential for the production of over 5,000,000,000 pounds of commercial fish, with a dockside value in 1980 of nearly $2,000,000,000 and recreational fisheries with a catch of about 200,000,000 fish and annual expenditures of over $1,000,000,000. These fisheries represent a capitalized value, at 6% yield, of about $50,000,000,000. That value is to be added to enhanced real estate prices, transportation benefit, waste placement use, other kinds of recreation, mining and other uses. Every use is predicted to increase, except for the legislated but unaccomplished water quality goal that pollution will be eliminated.

2. The estuaries are the most threatened part of the marine environment, principally by pollution.

   The estuaries occur at the ultimate foot-of-the-hill for every watershed in the nation. They receive partially treated sewage wastes; chemicals, sediment and trash from agricultural activity and urban run-off; and an enormous array of industrial products and by-products. All of the uses can damage the components and processes of the estuary and there are many examples of serious destruction. They are especially vulnerable to the thousands of newly invented chemicals which are not in the genetic history of the animals and plants - so they have no defense. The estuaries contain enormous populations of a comparatively small number of species, so that pollution kill of a single essential species might injure the food web - and our uses of it. Estuaries are also vulnerable to pollution from the oceans, entrained in the continuous in-flow of salt water. The rate of increase in use, and potential damage, is suggested for the Chesapeake Bay Region by Figures 1 and 2, showing the population change predicted from 1973 to 2020.

3. The estuaries are the most complex portion of the marine environment.

   The estuary is continuously changing because of variations in river flows, tide levels, temperature, wind, life cycles of organisms and other sources. Figures 3 and 4 suggest the great complexity of the food web and of the flow of energy - and there is continuous variation in the parts and processes. Solution of a pollution problem is likely to require understanding of the chemistry of the pollutant in the estuary, the relation of the pollutant to the sediments, the complicated physical circulation system, the biology of the animals and plants involved, the effect of salinity and temperature - and the rate and form of introduction of the pollutant. This complexity and intensity of these changing relationships does not occur in the open ocean. Coastal ocean areas are somewhat similar, but far less complex.

4. The estuaries are poorly studied.

   There has been rapid increase in estuarine research in recent decades - a recent report by C. B. Officer, L. E. Cronin, R. B. Biggs and J. H. Ryther noted that at least 1700 refereed papers on scientific, engineering and technical research on estuaries were published in a five-year period. This production is valuable, but the rate is true only for very recent years. In addition, there is indication that at least 80% has been directed toward comparatively narrow disciplinary studies in biology, chemistry, physics, economics, engineering, social studies or other limited areas. These are of value, but they are totally insufficient for adequate understanding of pollution effects in complex systems.

5. Effective management for the highest economic value is dependent on adequate understanding of the estuaries.

   The limits on success in balancing the uses of such systems are set by the bank account of reliable knowledge of the system. Empirical trial-and-error management has been employed, of course, but contains very high risks in a valuable Bay. With full recognition of the

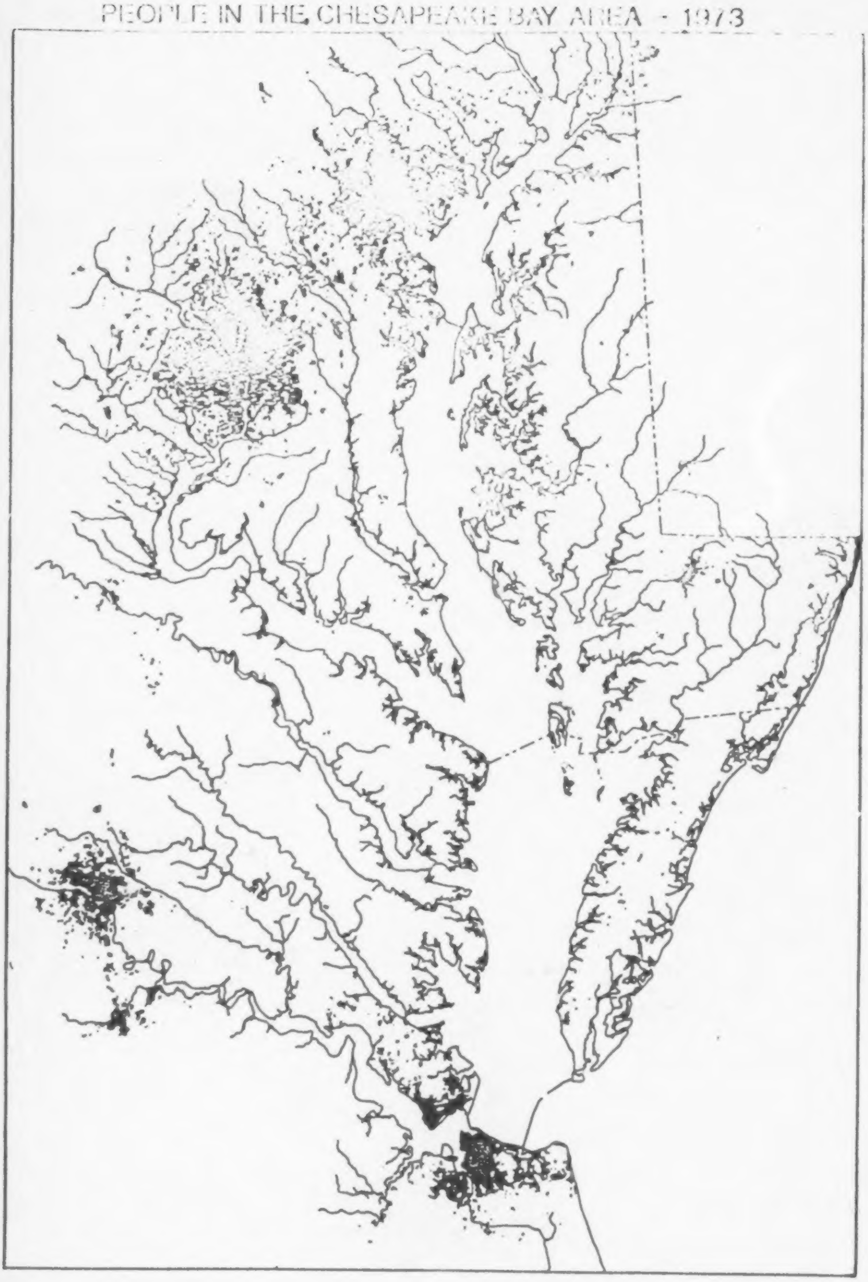

PEOPLE IN THE CHESAPEAKE BAY AREA - 1973

Figure 1. Chesapeake Bay region, indicating land used for residential and commercial activities as of 1973. After the Future Conditions Report of the Baltimore District of the Corps of Engineers

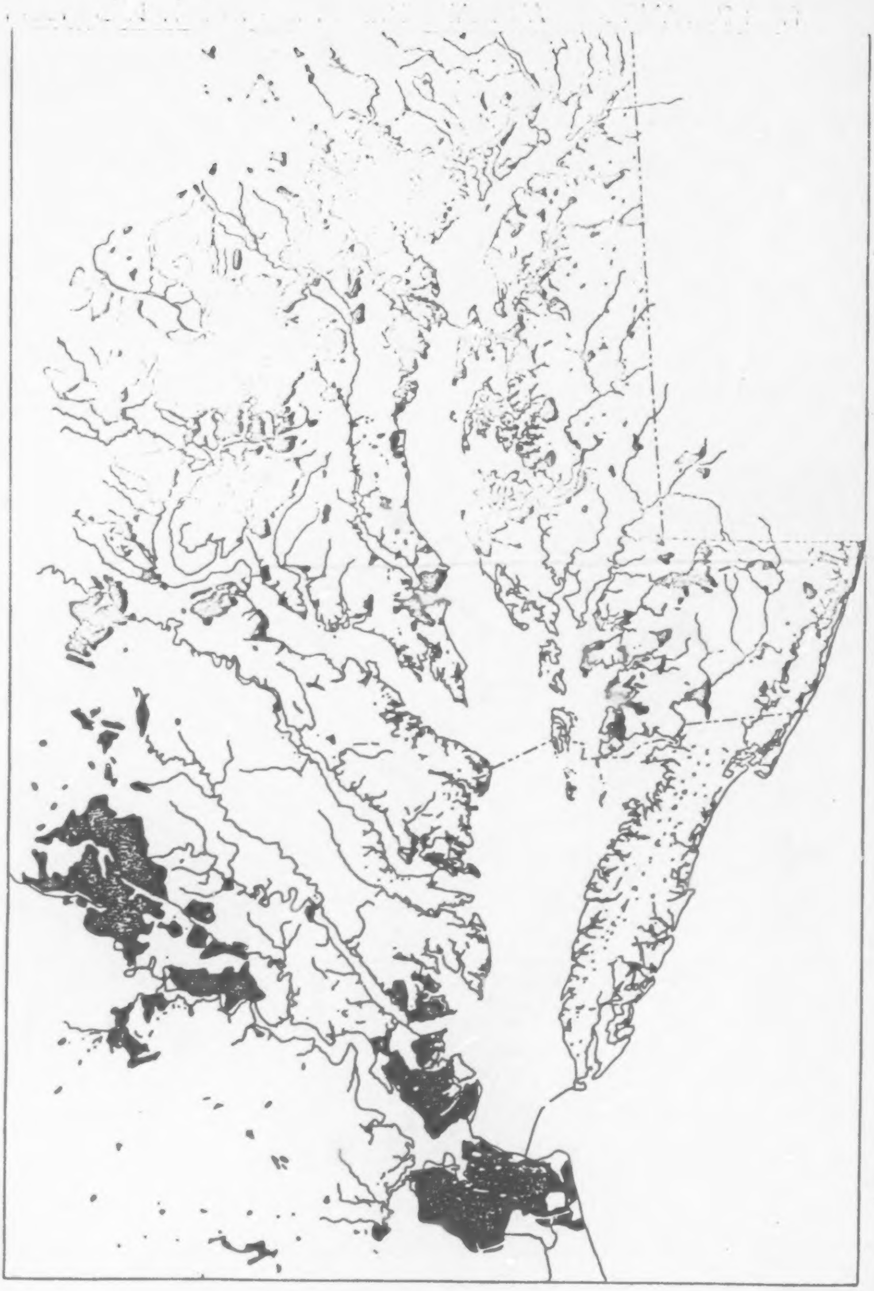
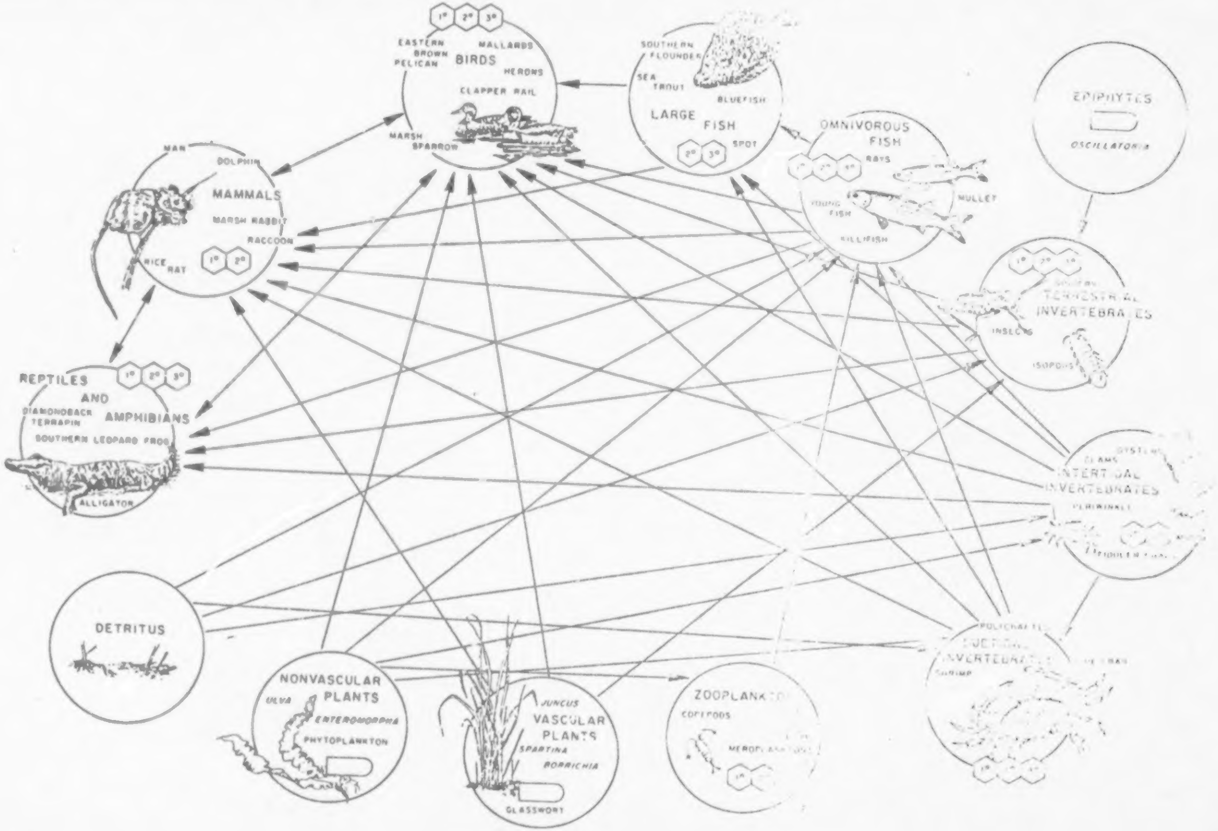
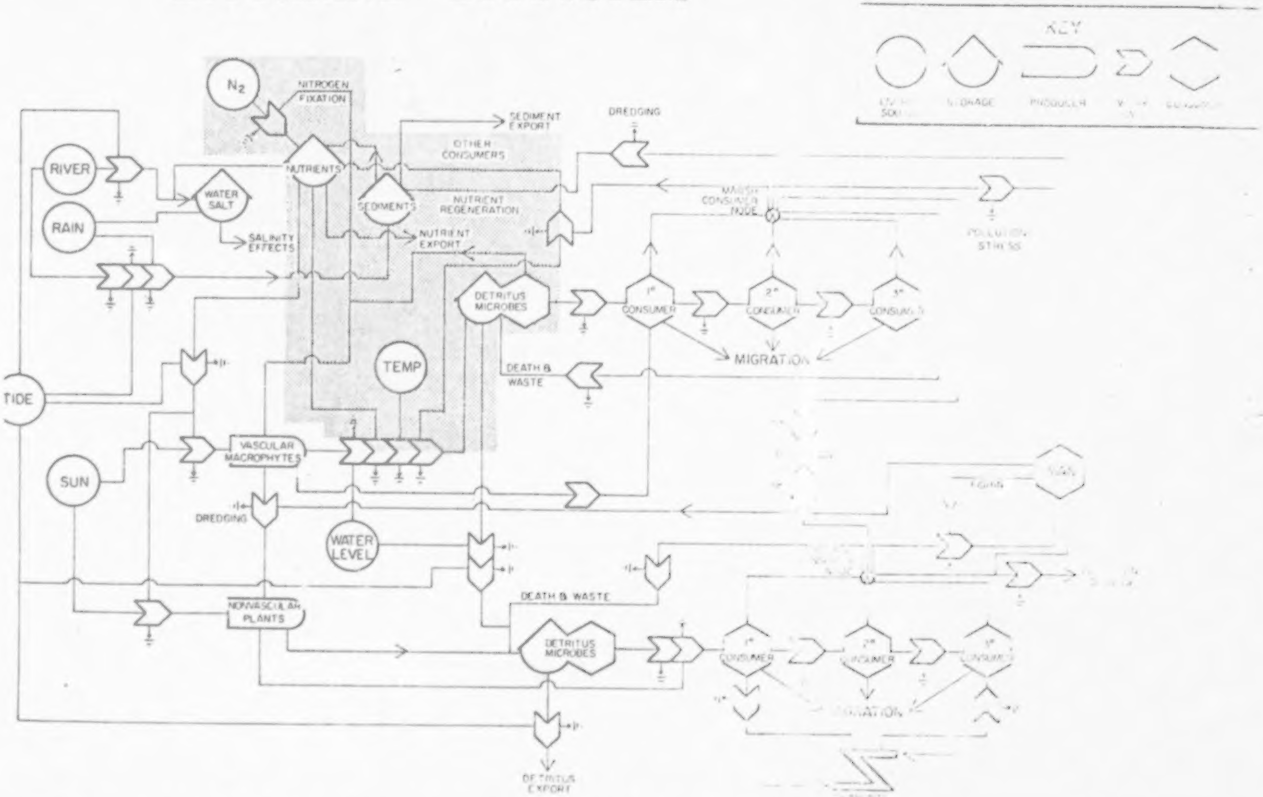


Figure 2. Chesapeake Bay region, indicating land used for residential and commercial activities as projected for 2020. After the Future Conditions Report of the Baltimore District of the Corps of Engineers

Figure 3. Estuarine food web. From Ecological Characterization of the Sea Island Coastal Region of South Carolina and Georgia - Resource Atlas. U.S. Fish and Wildlife Service, Dept. Interior.


1° 2° 3°
EASTERN BROWN PELICAN
BIRDS
MALLARDS
HERONS
CLAPPER RAIL
MARSH SPARROW
SOUTHERN FLOUNDER
SEA TROUT
BLUEFISH
LARGE FISH
SPOT
2° 3°
OMNIVOROUS FISH
1° 2° 3°
RAYS
MULLET
YOUNG FISH
KILLIFISH
EPIPHYTES
OSCILLATORIA
MAN
DOLPHIN
MAMMALS
MARSH RABBIT
RACCOON
RICE RAT
1° 2°
TERRESTRIAL INVERTEBRATES
INSECTS
ISOPODS
REPTILES AND AMPHIBIANS
1° 2° 3°
DIAMONDBACK TERRAPIN
SOUTHERN LEOPARD FROG
ALLIGATOR
OYSTERS
CLAMS
INTERTIDAL INVERTEBRATES
PERIWINKLE
FIDDLER CRAB
DETRITUS
POLYCHAETES
SUBTIDAL INVERTEBRATES
SHRIMP
1°
NONVASCULAR PLANTS
ULVA
ENTEROMORPHA
PHYTOPLANKTON
JUNCUS
VASCULAR PLANTS
SPARTINA
BORRICHIA
GLASSWORT
ZOOPLANKTON
COPEPODS
MEROPLANKTON
1°

ESTUARINE ECOSYSTEM


KEY
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PRODUCER
CONSUMER
N2
NITROGEN FIXATION
RIVER
RAIN
WATER SALT
SALINITY EFFECTS
NUTRIENTS
SEDIMENTS
SEDIMENT EXPORT
OTHER CONSUMERS
NUTRIENT REGENERATION
NUTRIENT EXPORT
DREDGING
MARSH CONSUMER INDEX
POLLUTION STRESS
DETRITUS MICROBES
1° CONSUMER
2° CONSUMER
3° CONSUMER
MIGRATION
DEATH & WASTE
TIDE
TEMP
SUN
VASCULAR MACROPHYTES
DREDGING
WATER LEVEL
MAN
NONVASCULAR PLANTS
DEATH & WASTE
DETRITUS MICROBES
1° CONSUMER
2° CONSUMER
3° CONSUMER
MIGRATION
DETRITUS EXPORT

Figure 4. Energy flow in the estuarine ecosystem. From Ecological Characterization of the Sea Island Coastal Region of South Carolina and Georgia - Resource Atlas. U.S. Fish and Wildlife Service, [illegible]

necessity for good law and managerial efforts, management cannot be fully effective with weak information.

6. Comprehension comes principally from research of good quality.

   Research places new deposits in the bank account to be drawn upon to assist management. The research must be relevant and competent, and pollution study usually requires a broad mixture of fundamental knowledge and applied research. The great value of fundamental research is that the results are usually universal - in this case they may be useful in all of the estuaries.

7. Therefore, there is critical need for increased, sustained and re-directed research on estuarine pollution to protect and enhance the high value of these bays and harbors.

Mr. Chairman, we also offer these responses to the specific questions posed in your invitation to testify:

1. The state-of-the-art of estuarine pollution research is grossly insufficient. We are not yet able to
   - Transfer excellent laboratory studies to the estuary to provide more than coarse estimates.
   - Predict the real and total effects of any pollutant proposed for release into estuaries.
   - Undertake the essential complex research on the multi-disciplinary problems resulting from significant pollution of estuaries.
2. The need for such research is critical. Coastal populations are expanding rapidly, uses are intensifying and conflicting, new chemicals are created - and the knowledge base is not yet sufficient to deal with the resulting problems.
3. The opportunities are excellent for effective estuarine research on pollutants.
   - Federal laboratories are well-equipped and have experienced and qualified scientists.
   - Every state supports related research and has laboratories which can be effective partners in such research.
   - The relevant academic community is large and available.
   - Consortia and other mechanisms exist which can pool facilities and scientific capabilities.
   - The Estuarine Research Federation is available to complement governmental programs with external review and advisory assistance.

4. We suggest the following distribution of responsibilities for estuarine pollution research:

Federal government - which must be substantially involved because pollution arises throughout the watersheds of the nation, because some kinds of research require large-scale funding, because research has nation-wide application, and because establishment of national limits on pollution is essential for multi-state guidance. General roles are:

- Coordination - to preclude both wasteful duplication and serious omissions.
- Funding of large-scale and nationally-useful research and monitoring.
- Provide quality control on national research programs.

  Conduct the research necessary to establish national guidelines.

State government - which manage pollution within their territories. Their roles appear to be:

- Fund research on the problems which are local and site specific.
- Establish appropriate regulations based on total national information and within national limits.

They cannot be fully sufficient because they receive much of their pollution burden from up-stream states and from the ocean.

Industry - which can be expected to perform such research as it considers to contribute to its profits. They will:

- Conduct proprietary research.
- Conduct such studies as may be required by government.

The academic community - which contains most of the scientists participating in related fundamental studies, can:

- Advise on the basic studies of greatest value.
- Conduct both complex and more limited studies on fundamental processes.
- Develop predictions of pollution effects.

5. The quality of government research in ocean pollution is mixed. We are aware that some of the studies at laboratories of the Environmental Protection Agency are excellent and at the front edge of learning. Much of our present national ability to develop regulations on pollution, imperfect

as they are, is based on this work. Not all programs and projects are of that quality, however, partly because scientists are sometimes redirected to fire-fighting studies and sometimes under beaurocratic or political constraints.

The governmental agencies appear to be moving away from the profitable investments in academic institutions of previous decades. A recent analysis of 1700 refereed publications showed the exceptionally high productivity of the academic community in estuarine and coastal research. 77% of the publications were from academic faculty, 15% from federal laboratories and 8% from state, municipal, industrial and other sources. Examination of the use of federal funds, however, indicated that only about 37% were awarded to the academic community. Concern has been expressed that the federal-academic partnership had deteriorated, to the detriment of the national interest.

6. To enhance our collective ability to make cross-media assessments of environmental impacts of waste placement, we suggest:

    Attract the best set of brains in governmental and academic laboratories to the problem.

    Design, fund and accomplish the sequential design of the program of research which will accomplish

    (1) adequate prediction capability on the impact of wastes in each medium.
    (2) adequate cross-medium assessment of total impacts.

7. We have no basis for comment on the broad effectiveness of the National Ocean Pollution Planning Act in coordinating ocean pollution research and monitoring. Resultant efforts have stimulated inter-agency discussions; provided regional and national assessment of problem needs, programs and funding; provided highly useful Working Papers to a broad community; and provided positive statement of national (more exactly federal) plans. These are constructive, but we cannot evaluate their effectiveness. We are of the opinion, however, that adequate research and monitoring related to ocean pollution has not yet been accomplished.

In summary, we believe that it is of critical national importance that the estuaries be protected from pollution damage and maintained in productive good health. They can then serve extraordinarily high values for the indefinite future, with proportionate and growing economic return. We recommend that adequate and appropriate research be conducted so that management knows and applies the capacities and limits of estuaries for receiving pollutants. The alternatives are (a) to protect them by extreme restriction on use or (b) risk massive losses in fisheries, recreation, shoreline values and other economically important uses as well as possible threat to human health. These alternatives are far more expensive - and need not be employed.

Mr. Chairman, the Estuarine Research Federation offers its assistance in your efforts. Again, thank you for this opportunity.

Mrs. **Schneider**. Thank you. Dr. Evans.

STATEMENT OF DR. MARLENE EVANS, PRESIDENT, INTERNATIONAL ASSOCIATION FOR GREAT LAKES RESEARCH, ANN ARBOR, MICH.

Dr. **Evans**. I am Marlene S. Evans, associate research scientist at the Great Lakes Marine Water Center at the University of Michigan. In addition, I am president of the International Association of Great Lakes Research. IAGLR is highly concerned about the proposed cuts in U.S. Federal funding for Great Lakes research planning and management activities. I welcome this opportunity to speak to you on behalf of IAGLR and voice these concerns.

The Great Lakes consists of five major bodies of fresh water: Lakes Superior, Michigan, Huron, Erie, and Ontario. These lakes span a total area of 95,000 square miles and constitute 95 percent of the surface fresh water in the United States. These vast bodies of water can in a sense be viewed as inland seas. However, they differ from marine waters in two vital senses. First of all, they are fresh waters, and as a result used extensively for irrigation and for drinking.

Second, they are enclosed in relatively closed basins, with the result that their waters have relatively long residence times. For example, the residence time of water in Lake Superior is on the order of several hundred years.

The Great Lakes are a valuable resource which have contributed much to the economic growth of the United States and Canada. In addition to mining, heavy industry, and manufacturing, these include fishing, both commercial and sport, recreation, power generation, and transportation. One-fifth of the U.S. population and one-quarter of the American industry presently rely on its waters. As a result of these riches, the Great Lakes have been used and abused for decades. Environmental problems were first detected as early as 1850 and continued to persist to this day.

There are several major problems facing the lakes. One of these is eutrophication. Although much progress has been made toward eliminating or reducing eutrophication in the Great Lakes, the problem is not fully resolved and further remedial action may be necessary.

A second area of environmental concern is toxic organics. More than 33 percent of the hazardous chemicals produced in the United States are generated in the Great Lakes basin. Many of the chemicals manufactured by these industries enter the lakes from more than 800 major municipal and industrial discharges, runoff, and from the atmosphere.

A significant number of these chemicals pose environmental hazards. Scientists and lake managers working on the lakes are anxious to avoid the catastrophes which we observed in the 1960's and 1970's. For example, PCB pollution became an issue for the Great Lakes when mink farmers noticed that the mink were becoming increasingly infertile. This infertility was later traced to lake trout which were fed to these mink and which contained high levels of PCB.

Other areas of concern include habitat alterations and major discharges of salts into the lakes, the maintenance of fish stocks to levels sufficient to support a viable commercial and sport fishery, and consumptive uses and diversions of Great Lakes waters.

How has the Federal Government responded to these environmental issues? It has done so in two basic ways. First, it has negotiated with Canada in 1972 and in 1978 water quality agreements that set guidelines for the usage of the lakes, acceptable levels of contaminants, and strategies for the surveillance and monitoring studies to determine the effectiveness of these agreements.

Second, the Federal Government has established a number of agencies and laboratories to deal with various aspects of Great Lakes research management and planning activities. In the last year we have seen serious erosion of the capabilities of these Federal agencies to accomplish these managing, planning, and research activities. I will just briefly summarize what these erosions have been.

The Environmental Protection Agency has two laboratories which deal directly with the Great Lakes. The Great Lakes National Program Office, located in Chicago, conducts research and surveillance studies on the Great Lakes. Their surveillance program includes joint studies with Canadian researchers and are part of the 1972 and 1978 water quality agreements negotiated between Canada and the United States.

These studies are central to determine the effectiveness of the remedial action programs and to anticipate new problems before they become unmanageable, and to provide the basic data necessary to provide mathematical predictive models of processes in the lake. This laboratory has experienced severe budget cuts in 1981 and 1982, and its research vessel will not be operating this year even though surveillance studies are planned.

The other Environmental Protection Agency laboratory is the Large Lakes Research Station at Grosse Ile. This laboratory monitors pollutants in the air and water, develops predictive models, conducts research on toxic contaminants, and evaluates the effectiveness of the nutrient reduction programs.

This laboratory has had an active role in Great Lakes research and management, and has an excellent scientific reputation in

Canada and abroad. Nevertheless, this lab was scheduled to be closed in 1981. Active efforts both by Canadians and Americans were instrumental in this lab remaining functional in 1982. However, this lab again is scheduled to be closed this year.

If I may mention just one program they are now conducting, the lab has recently determined that toxaphene, a pesticide used in the South and in the West, occurs in high concentrations in lake trout collected in Lake Siskuirt in Isle Royale in Lake Superior. Furthermore, the laboratory has evidence suggesting that toxaphene is widespread throughout the lakes. If this lab is closed, it will not be able to continue to investigate toxaphene problems on the Great Lakes.

I might briefly mention the National Oceanic and Atmospheric Administration. One lab is the Great Lakes Environmental Research Laboratory in Ann Arbor, Mich. This lab conducts research on particle dynamics, the transport of organic contaminants, nutrient flux, physical limnology, storm surges, ice prediction, and hydrology. This lab again has been highly productive since its existence.

One of the active programs is the study of the cycling transport and the fate of the toxic compounds in the Great Lakes. And this laboratory is getting new information on the behavior of toxic organic sediment/water interface.

In the past, researchers believed that contaminants settled in the water column and reached the sediments, and they essentially became buried by overlying materials. What the Great Lakes Environmental Research Laboratory has determined is that the sediment/water interface is very active, and that during certain times of the year, particularly the winter, much of the overlying sediments are mixed throughout the water column. The implication of this research is that contaminants will continue to pose environmental problems for longer periods of time than previously considered.

This laboratory, as I mentioned earlier, is also scheduled to be closed, and so it will not be able to complete its work.

The national sea grant program was established by Congress in 1966. This program has been very productive both to the Great Lakes community and nationwide. Among its achievements is the cold water near-drowning study, which has been instrumental in saving countless numbers of lives of people who had been immersed in cold water for long periods of time. Also it has had other successes of which it can be quite proud. Sea grant also is scheduled to be terminated in 1982.

Other laboratories which were closed or essentially closed in 1982 include the coastal zone management program, the Water Resource Centers and the Great Lakes Basin Commission.

What are the implications of these proposed budget cuts? In 1981 the Federal Government funded approximately $30 million toward Great Lakes research management and funding activities. With the closures of several agencies in 1981 and proposed closures or reductions of further agencies in 1982, IAGLP estimates that there has been a loss of approximately $24 million for the protection and management of the Great Lakes. This is a substantial loss, and appears to extend beyond basic economic considerations.

While IAGLP recognizes the need for financial constraint, money saved by reducing Federal spending on the Great Lakes is not cost effective. The Great Lakes are a national resource and as such generate significant income. Large amounts of income are, for example, generated from shipping. The Great Lakes have a great recreational value and generate more than $5 billion in income. This income is dependent on the lakes continuing to be attractive to the vacationer. The overall quality of the lake waters and the biota must be protected.

Furthermore, lake water is used extensively in agriculture and in drinking, and again it is vital to protect the quality of the waters. While the Federal Government has spent some tens of millions of dollars each year toward protecting the lakes, this cost is small in terms of benefits reaped. It translates to a cost of approximately $1 per person per year, which is a good bargain.

The final point which I was asked to address is why the Federal agencies should be conducting research on the lakes rather than State agencies. First and foremost, the pollution problems on the Great Lakes do not recognize State boundaries. Nutrients entering Lake Erie from the city of Detroit travel through Michigan, Ohio, Pennsylvania, and New York waters before entering Lake Ontario. Many of the pollutants entering the lakes do so from the atmosphere.

A problem which is tractable at the Federal level becomes intractable at the State level. It is true that the States do conduct research on the Great Lakes, but they do so in the near shore area. This is a band of water less than 10 miles wide. However, the lakes themselves are more than 50 miles wide and relative little State effort is addressed in the offshore waters.

Why should States be obligated to conduct research in these areas, and how can they accomplish this? Is each State laboratory to duplicate facilities permanently established in the Federal laboratory? Dividing major programs into groups and losing overview of lake processes will hinder and not improve progress.

Canada and the United States have negotiated agreements for the mutual protection and management of the Great Lakes waters. Such management clearly is necessary, given previous problems of fish contamination by heavy metals and toxic organics, eutrophication and continuing discussions that are being made between the two countries regarding future consumptive uses of the waters and possible diversions of Great Lakes waters. Such problems are most effectively dealt with at the Federal level, where there is a mandate to set policy and decisions that affect the Nation as a whole.

[The prepared statement of Dr. Evans follows:]

STATEMENT OF MARLENE S. EVANS, PRESIDENT OF THE INTERNATIONAL ASSOCIATION FOR GREAT LAKES RESEARCH BEFORE THE SCIENCE AND TECHNOLOGY COMMITTEE, SUBCOMMITTEE OF NATURAL RESOURCES, AGRICULTURAL RESEARCH, AND ENVIRONMENT

FEBRUARY 25, 1982

I am Marlene S. Evans, Associate Research Scientist at the Great Lakes and Marine Waters Center of the University of Michigan. For the last eight years, I have been directly involved with research on the Great Lakes as a university employee. In addition, for the past three years, I have been serving on the Board of Directors for the International Association for Great Lakes Research (IAGLR) and currently am its President. IAGLR consists of more than 750 members from the United States, Canada, and overseas who promote research and the effective management of the world's large lakes. We accomplish these goals through our annual meeting, which is attended by several hundred researchers from all disciplines, and through publication of the Journal of Great Lakes Research and the newsletter Lakes Letter. IAGLR is highly concerned about the proposed cuts in U.S. Federal funding for Great Lakes research, planning, and management activities. I welcome this opportunity to speak on behalf of IAGLR in voicing these concerns.

My statements address the following. First, I would like to implant in your minds a strong appreciation for the immeasurable worth of the Great Lakes. The lakes are valuable not only for their beautiful waters, which form part of our national heritage, but also as an immense economic resource, which must be effectively managed. Second, I will briefly discuss the major environmental issues which are of concern to scientists and managers working on these lakes. Third, I will discuss how the Federal government has funded activities to address these concerns and will highlight some of the major accomplishments of the agencies conducting these studies. Fourth, I will discuss how the proposed budget cuts will affect these programs and ultimately the lakes themselves. Fifth, I will discuss why it is appropiate for the Federal government to have responsibility in conducting such activities.

The Great Lakes

The Great Lakes, crowning the midwestern states, consist of five major bodies of water— Superior, Michigan, Huron, Erie, and Ontario. These lakes span a total area of 95,000 square miles and constitute 95% of the surface fresh water in the United States. The lakes range in width from 53 miles to 160 miles and in length from 193 to 350 miles. Glaciers have gouged the lake floor to depths of more than 1,000 feet in Lake Superior and more than 750 feet in Lakes Michigan, Huron, and Ontario. The lakes extend from Duluth at the western end of Lake Superior, along more than 1,160 miles of waterways, to the St. Lawrence Seaway. Lake Superior is the northernmost lake— icy cold even in summer. The lake is located in a granitic drainage whose rocks are among the oldest on the earth- more than two billion years old. The forested drainage basin provides a significant revenue to the country through forestry and mining. Further south, one encounters warmer waters, more gentle topography, and greater urban and industrial development. Rich agricultural lands are found in the southern drainage basins of Lakes Michigan, Huron, Erie, and Ontario. In addition, there is extensive industrial development in these southern regions as a result of iron ores in the Lake Superior drainage basin, limestone, salt, and gypsum in the Lakes Huron and Michigan drainage basins, coalfields to the south, and accessible shipping routes. More than 59% of the steel production, 65% of the automobile production, and 70% of the iron ore production in the United States is conducted in the Great Lakes drainage basin.

The Great Lakes are a valuable resource which have contributed much to the economic growth of the United States and Canada. In addition to mining, heavy industry, and manufacturing, these include fishing (both commercial and sport), recreation, power generation, and transportation. One-fifth of the United States population and one-quarter of the American industry presently rely on its waters.

As a result of these riches, the Great Lakes have been used and abused for decades. Environmental problems first were observed in the mid-1850's and some persist to this day. What are the major environmental issues today? How has the Federal government responded to the needs of the citizens inhabiting the drainage basins and ultilizing its resources?

Eutrophication (the addition of excess amounts of nutrients to the lakes) remains an issue of active environmental concern. Sources of nutrients include sewage, detergents, runoff from agricultural areas, and atmospheric input. Although much progress has been made in reducing eutrophication in the lower lakes, the problem is not fully solved and further remedial action may be necessary.

A second area of environmental concern is toxic organics. More than 33% of the hazardous wastes produced in the United States are generated in the Great Lakes basin. The drainage basins have extensive deposits of salt, limestone, and gypsum which were laid down millions of years ago when the region was submerged by oceans. These deposits are vital in the manufacture of a number of products and chemical industries have located in the drainage basin in order to be close to their basic raw materials and the abundant supply of fresh water. Many of the chemicals manufactured by these industries enter the lakes from more than 800 major municipal and industrial discharges, runoff, and the atmosphere. A significant number of these chemicals pose serious environmental hazards. Scientists and lake managers are anxious to avoid the catastrophes of the 1960's and 1970's. For example, PCB pollution became an issue when Great Lakes mink farmers noted that mink were becoming increasingly infertile. This infertility was traced to high PCB levels in the Great Lakes salmonids which comprised mink diets. Lowered mink fertility and then higher feed costs adversely affected these farmers by decreasing their revenue. Sixty percent of the U.S. mink farms are located in the Great Lakes drainage basin and had a 1980 product market value of $70 million dollars. While the PCB problem is becoming managable, many concerns remain regarding the continued persistance of PCBs in the environment. Fish inhabiting certain regions of the Great Lakes continue to have high body burdens of PCBs.

There are now concerns regarding the effects of the large numbers of new and potentially toxic organics which continue to enter the lakes. Do any of these new compounds have the potential for becoming the PCBs of the 1970's? Since the Great Lakes are relatively closed systems whose waters have long residence times, compounds entering the lakes from the atmosphere, runoff, and discharges tend to persist for longer periods of time than in the oceans or in more readily flushed small lakes.

Other areas of concern include habitat alterations, the major discharges of salts into the lakes, the maintenance of fish stocks to levels sufficient to support a viable commercial and sport fishery, and consumptive uses and diversions of Great Lakes waters. Time does not permit me to address these issues in further detail.

How has the Federal government responded to these environmental issues? It has done so in two basic ways. First, it has negotiated with Canada the 1972 and 1978 Water Quality Agreements which set guidelines for the usage of the lakes, acceptable levels of contaminants, and strategies for surveillance and monitoring studies to determine the effectiveness of these agreements. Furthermore, the agreement is renegotiated every five years as conditions on the lakes change. Secondly, the Federal government has established a number of agencies and laboratories to deal with various aspects of Great Lakes research, management, and planning activities.

In the last year, we have seen serious erosion of the capabilities of Federal agencies to conduct these managing, planning, and research activities. In addition, it is becoming increasingly more difficult for these agencies to participate in fulfilling the obligations of the Water Quality Agreement. I would like to discuss the agencies and laboratories which were active in 1981, their missions, their major accomplishments, and their fate or proposed future. Already, in 1982, we have seen reductions and eliminations of programs and activities. As a consequence, IAGLR is all the more alarmed about the additional cuts now being discussed.

Environmental Protection Agency

The Environmental Protection Agency has two laboratories which deal directly with the Great Lakes. The Great Lakes National Program Office (Region 5), located in Chicago, conducts research and surveillance studies on the Great Lakes. The surveillance program includes joint studies with Canadian researchers as part of the 1972 and 1978 Water Quality Agreements negotiated between Canada and the United States. These studies are essential to determine the effectiveness of remedial action, anticipate new problems before they become unmanagable, and provide the basic data necessary to develop mathematical, predictive models of processes in the lakes. The laboratory has experienced severe budget cuts and it is anticipated that its research vessel, the Simons will not operate on the lakes in 1982. While surveillance studies are planned for the lakes this year, a greater proportion of the work must be accomplished by the Canadians.

The Large Lakes Research Station at Grosse Ile, Michigan, was established in 1971 after President Richard Nixon and Prime Minister Pierre Trudeau signed an agreement to survey and correct pollution in the boundary waters between Canada and the United States. The laboratory monitors pollutants in the air and water, develops predictive models, conducts research on toxic contaminants, and evaluates the effectiveness of nutrient-reduction programs. Its 1978 projections for target loadings for phosphorus were instrumental in the ban of high phosphate detergents. As a result of reductions in phosphorus loadings, Saginaw Bay has shown more than a 50% reduction in chlorophyll. Similar improvements in the water quality of Lake Erie are expected. This laboratory has developed and maintains in STORET, an immense computerized data base containing physical and chemical data collected from the Great Lakes over the last twenty years. These data are accessible to researchers throughout the world, provide valuable information on long-term trends in the Great Lakes, and form the data base for many predictive models of lake processes. Furthermore, the Grosse Ile laboratory has developed an excellent reference library of chemical compounds which is used by toxicologists to identify particular organic contaminants.

The Grosse Ile Laboratory has had an active role in Great Lakes research and management and has an excellent scientific reputation in Canada and abroad. Nevertheless, it was scheduled to be closed in 1981. Active efforts both by Canadians and Americans were instrumental in its remaining functional in 1982. However, the laboratory again is scheduled to be terminated this year. What will these closures mean in terms of specific projects? It is clear that most of its ongoing studies will not be completed. The detailed study of toxic organic contaminants in Saginaw Bay will not be taken to completion. At present, mathematical models are being developed to determine the fate and transport of organic contaminants on a seasonal basis in this Lake Huron embayment. The study is the most detailed of its kind and will provide new information on the environmental behavior of organic contaminants. The laboratory recently has determined that toxaphene, a pesticide used in the south and in the west, occurs in high concentrations in salmonids collected in the supposedly pristine waters of Lake Siskiwik (Isle Royale, Lake Superior). Atmospheric transport is the probable route of contamination. Furthermore, the laboratory has evidence suggesting that toxaphene is widespread throughout the lakes and its detection previously was masked by interference by other compounds. New analytical procedures have remedied this problem. Toxaphene is a highly toxic compound and it is vital that Great Lakes scientists learn more about its distribution, behavior, and transport routes. Closure of the Grosse Ile Laboratory will set such toxaphene investigations back several years.

Department of Energy

The Argonne National Laboratory in Argonne, Illinois, had a Great Lakes program for more than a decade. Research areas included the movement of radionuclides through the ecosystem, thermal pollution from power plants, and heavy metal bioassay studies. This program was terminated in 1981.

National Oceanic and Atmospheric Administration

The Great Lakes Environmental Research Laboratory conducts research on particle dynamics, the fate and transport of organic contaminants, nutrient fluxes, physical limnology, storm surges and ice prediction, and hydrology. Meteorological, hydrological, and ice data generated by this laboratory are used by the National Weather Service, by the Corps of Engineers, and by the St. Lawrence Seaway Development Corporation. The predictive mathematical model for oil spills developed by the laboratory allows the Great Lakes' Coast Guard to deal effectively with such accidents. The laboratory participated in the renegotiation of the 1978 Water Quality Agreement by developing a mathematical model on waste abatement programs and human development in the drainage basins.

The Great Lakes Environmental Research Laboratory is scheduled to be closed in 1982. What will this mean to its ongoing programs? The laboratory has an active program studying the cycling, transport, and fate of toxic organic compounds in the Great Lakes and is obtaining new information on the behavior of toxic organics at the sediment-water interface. Previously researchers believed that once a contaminant reached the sediments, it rapidly became buried by a continual rain of sinking particles and ceased to pose an environmental hazard. Scientists at the Great Lakes Environmental Research Laboratory now have determined that much of this sedimentary material is resuspended in the water column, particularly in winter. The implication is that contaminants will continue to pose an environmental problem for longer periods of time than previously considered. The laboratory continues to assess the state of knowledge on nutrient cycling in the Great Lakes. Such information is vital because, although phosphorus inputs to the lakes have been reduced, the lakes have not and may not (under current environmental guidelines) return to their original condition. The laboratory is constructing an ice atlas for the Great Lakes and obtaining new information on currents and storm activities. Such knowledge is essential for the shipping industry to grow and possibly extend the winter navigation season. Without these studies, much needed understanding and basic information on the Great Lakes will not become available for the more effective management of these systems.

The National Sea Grant Program was established by Congress in 1966. Its program objectives are to increase the understanding, assessment, development, utilization, and conservation of Great Lakes resources by providing assistance to promote a strong educational base, responsive research and training activities, and broad dissemination of knowledge and techniques. Sea Grant has programs in New York, Ohio, Michigan, Wisconsin, and Minnesota and funds research in fisheries, toxic substances, public education, recreation, coastal zone resources, and water safety. The program has had several important benefits to the Great Lakes community and nationwide. The cold-water near-drowning study has been instrumental in saving countless numbers of lives of people who apparently had drowned in cold water. Through proper techniques, such people who have been submersed in cold water for up to forty minutes have been successfully revived by trained personnel. Sea Grant funded a study which helped determine the cause of mink reproductive failure and enabled farmers to find a safe and inexpensive alternate feed based on underutilized fish. This study benefited both the mink farmer and the commercial fishermen. Sea Grant has initiated the development of underwater preserves in the Great Lakes. It is estimated that diving-related expenditures in Michigan alone total $10 million annually. Although the program is still being developed, positive benefits already have been reaped by two Michigan communities.

Sea Grant is scheduled to be terminated in 1982. This will result in a substantial loss to the Great Lakes community in public education, water safety, resource development, and fisheries improvement. Ongoing programs to investigate reproductive habits of lake trout will not be completed. Work on wetlands, ship design, and toxic substances will be terminated.

The Coastal Zone Management Program conducted research on resource decision making and shoreline erosion. The program included engineers, sociologists, geologists, and geographers. The program essentially was terminated in 1981. Water Resources Centers, whose offices in the eight states conducted research on tributary inputs, ground water, and hydrology, also have been terminated.

The Great Lakes Basin Commission was established by Congress in 1965 and was a planning agency with members from the eight Great Lakes states. Eleven Federal agencies and one interstate commission were part of the Great Lakes Commission. The Commission coordinated research and plannng for interstate resources: regulation of lake levels, shoreline erosion, expansion of commercial navigation, water pollution and supply, and increasing recreation demands. The Commission was highly productive and held numerous workshops and published documents on the use of vegetation to reduce shoreline erosion, cost-effectiveness of pollution reduction, transport and disposal of hazardous wastes, and winter navigation. The Commission was closed in 1981. It was the only planning agency of its kind on the Great Lakes. Its loss is immeasurable.

Department of the Interior

The U.S Fish and Wildlife Service monitors fish populations in the Great Lakes evaluating the effectiveness of stocking programs, sea lamprey control, and the status of various commercial and forage fishes. In addition, the Service monitors organic and heavy metal contaminants in Great Lakes fishes. With the 1981 agency closings, and the proposed 1982 closings or reductions in funding to Federal laboratories, the Service will be the major remaining Federal agency charged with the protection of Great Lakes waters.[4] This is a large task for an agency whose primary focus is fish.

Implications of Federal budget cuts

What are the implications of these proposed budget cuts? In 1981, the Federal government funded approximately $30 million towards Great Lakes research, management, and planning activities. With the closure of several agencies in 1981 and the proposed closures or reduction of further agencies in 1982, IAGLR estimates that there will be a loss of approximately 27 million dollars for the protection and management of the Great Lakes. This is a substantial loss and appears to extend beyond basic economic considerations.

What does this loss mean? No effort has been made to transfer missions accomplished by Federal laboratories to state agencies or to universities. Thus the loss is real and has important implications for the future of the Great Lakes. The recent results of a survey conducted by Senator Riegle of Michigan indicate that only 24% of the 200,000 respondents wished to see a decrease in Federal spending on environmental cleanup. However, the government now is proposing a massive reduction in such activities on the Great Lakes.

While IAGLR recognizes the need for financial constraint, money saved by reducing Federal spending on the Great Lakes is not cost effective. The Great Lakes are a national resource and, as such, generate significant income. More than 85 million tons of iron ore and more than 30 million tons of grain are transported on the lakes each year. More cargo is carried through the locks at Sault Ste. Marie during its climatically restricted shipping season than in a twelve month shipping season on the Panama Canal. If the shipping industry is to remain viable and grow, the Federal government must continue to sponsor research to help meet the needs of the industry and the people affected by it: current patterns, ice dynamics, effects of dredging, and the implications of extending the winter navigation season.

The Great Lakes and their drainage basins are of immense recreational value and generate more than 5 billion dollars in income each year. This income is dependent on the lakes continuing to be attractive to the vacationer. Research must continue on processes of shore erosion: the home builder still requires guidance in safe cottage siting. The overall quality of lake waters and biota must be protected. Vacationers will not visit beaches covered with rotting algae. Nor will they fish for trout which are so heavily contaminated by PCBs or other toxic organics that they must restrict their consumption of such fish.

Agriculture contributes more than 20 billion dollars each year to the national economy and utilizes 157 million gallons of water each day for irrigation. This resource must remain uncontaminated with toxic compounds. Each day over 3000 million gallons of water are used (including consumption) by the people inhabiting the drainage basin- this water must remain pure and free from noxious tastes (which often accompany eutrophic waters) and from toxic chemicals.

While the Federal government has spent several tens of millions of dollars each year (in recent times) towards managing the Great Lakes, this cost is small in terms of the benefits reaped. It amounts to approximately $1 per person per year- a small price to pay and more than recovered in terms of revenue generated.

Closure of the Federal agencies will have additional repercussions apart from potentially damaging a valuable resource. Talented scientists, managers, and planners will leave the drainage basin to find new jobs. If plans later are developed to re-establish programs now being eliminated, it will take three to five years to accomplish these goals. During this period, we will have lost valuable information on processes occurring in the lakes.

Proposed closures of the Federal laboratories will have an adverse effect on the university community. The Environmental Protection Agency, The Great Lakes Environmental Research Laboratory, Sea Grant, and other Federal agencies have provided contracts to university and college scientists. Such contracts have enabled faculty to conduct research and remain viable in the Great Lakes' academic community. Furthermore, these contracts have enabled universities to provide training to undergraduate and graduate students and produce a new generation of scientists, managers, and planners to work on the Great Lakes. Without such funding, these training programs will be reduced or eliminated.

Why the Federal government?

Finally, I have been asked to address the question why the Federal government should fund such research on the Great Lakes. There are several reasons for this and, as in the other aspects of my presentation, can only be briefly alluded to here.

First and foremost, the pollution problems for the Great Lakes do not recognize state boundaries. Nutrients discharged from the city of Detroit into the western end of Lake Erie travel through Michigan, Ohio, Ontario, Pennsylvania, and New York waters before entering Lake Ontraio. Many of the pollutants entering the lakes do so from the atmosphere- PCBs and toxaphene for example. A problem which is tractable at the Federal level becomes intractable at the state level.

The states do conduct research on the Great Lakes but in the nearshore area- a band on water less than ten miles wide. However, most of the pollutants reside in the open waters of the lakes: 30, 40, or 50 miles from a state shoreline. Why should the states be obligated to conduct research in these areas and how will they accomplish this? Is each state to duplicate facilties currently established in Federal laboratories? Must each state operate a multimillion dollar research vessel, purchase gas chromatographs costing tens of thousands of dollars, have similiarly qualified people working on the same problem with the only distinction being geographic region? Communication between agencies often is difficult at the best of times. Dividing major programs into groups and losing overview of lakewide processes will hinder and not improve progress.

Canada and the United States have negotiated agreements for the mutual protection and management of the Great Lakes waters. Such management clearly is necessary given previous problems of fish contamination by heavy metals and toxic organics, eutrophication, and continuing decisions which must be made regarding future consumptive uses and diversions of these waters. Such problems are most effectively dealt with at the Federal level where there is the mandate to set policy on decisions which affect the nation as a whole. The agreements established between the United States and Canada have been productive in minimizing environmental degradation, in more effective management of the lakes, and in the free exchange of knowledge and understanding of the functioning of these waters. The Water Quality Agreement is scheduled to be renegotiated in 1983 and it is to be hoped that the experienced scientists and managers currently working on the lakes will still be available to participate in these discussions.

Summary

In summary, the Great Lakes are a valuable resource to the people of the United States, not only as aesthetically beautiful bodies of waters, but as a source of revenue and well-being for the populace inhabiting its drainage basin. With increasing demands for freshwater and proposed multiple uses of this resource, it is vital that the Federal government continue to sponsor research, planning, and management activities on the Great Lakes. However, in 1981, the government has closed a number of agencies conducting such work and proposes to continue closing or severely restricting the productivity of the remaining agencies. IAGLR views these actions as being counterproductive. The savings incurred by such budget cuts work out to less than $1 per year per person inhabiting the drainage basin. Undoubtedly the taxpayer will pay a substantially higher cost in later years when new programs are developed. Given the more than 100 year history of environmental perturbation on these lakes, environmental problems will continue to arise. IAGLR, as an international association devoted to a greater understanding of large lakes is alarmed by such proposed cuts and strongly recommends that the Federal government reconsider such actions.

Mrs. SCHNEIDER. I thank both of you for your extremely specific and very good testimony. As a matter of fact, it was so specific in answering all of the questions that we requested of you that I only have a limited number of questions to ask.

Dr. Cronin, it seems that so many of our regulations for ocean disposal are so much stronger than those for estuarine disposal. I just wonder if you could comment as to how can this possibly make sense considering how very fragile the estuarine systems are by comparison to an ocean system.

Dr. CRONIN. One difficulty with the estuaries is that the direct governmental control rests with the States, and to some extent with local governments. One of the reasons why a Federal presence is important is because the local government is heavily influenced by the short-term economic values, and I don't think any city would by itself adopt wise long-term management of its wastes if it didn't have some broader pressure to take care of the downstream users, of all the people that might be affected by such actions. Perhaps that is a reason.

Mrs. SCHNEIDER. Dr. Evans, how do the levels of the PCB in the mink that you were mentioning before compare to some of the levels in the Great Lakes fish today that are being found?

Dr. EVANS. Could you repeat that question?

Mrs. SCHNEIDER. You mentioned that there were mink in the Great Lakes region that had been fed fish from the Great Lakes, and I wondered what the levels of PCB are in those mink, and how those levels compared with the levels that are found in the fish in the Great Lakes.

Dr. Evans. Few studies have investigated PCB levels in mink per se. However, PCB's were of concern to mink farmers in the late 1960's and early 1970's. At that time, mink consuming Great Lakes fish were experiencing high reproductive failure and kit mortality. When it was demonstrated that PCB contamination in these Great Lakes fish caused the problem, farmers were forced to utilize alternate—and more expensive—feeds. Subsequently, a Sea Grant funded study determined that fish meal made from under-used Great Lakes fish was safe for mink consumption during their growth phases. PCB levels have declined in Great Lakes fish although levels remain sufficiently high in certain fish to adversely impair mink reproductive success and kit survival. The problem is now sufficiently understood so that mink farmers can successfully rear their mink and avoid PCB contamination in the animals' diet.

Mrs. Schneider. Will the proposed elimination of research funds for this office in 1983 prevent the United States from meeting its commitment to article VI of the Great Lakes Water Quality Agreement that was signed in 1978?

Dr. Evans. I do not remember the specific wording of article VI of the Water Quality Agreement of 1978 and will answer the question more completely at a later date. According to the agreement, Canada and the United States agree to conduct studies to survey the Great Lakes waters in order to maintain water quality and to minimize environmental damage as a result of human usage of Great Lakes resources. The proposed budget cuts and earlier budget cuts have adversely affected Federal laboratories' abilities to conduct research, planning, and management activities on the Great Lakes. The Water Quality Agreement should be renegotiated in 1983. However, with current reductions in funding, few scientists will remain employed in Great Lakes Federal agencies to continue the current activites required according to the 1978 agreement or to participate in the formulation of the new agreement.

Mrs. Schneider. We've also often heard that some of our fisheries such as the striped bass and the bay scallops are threatened because of pollution in the estuaries and the destruction of some of the wetlands that has taken place. I wonder if either one of you would like to comment, particularly Dr. Cronin, on the estimate of the ecological health of Chesapeake Bay. For example, is it improving now, or do you feel that it is declining?

Dr. Cronin. My personal opinion on this matter, to which I have given a great deal of thought, is that the open bay is in good health. We have, however, serious trouble in many of the tributaries. The serious problems tend to cluster toward the headwaters. That is where towns and cities are frequently located and that is where large volumes of material come into the bay system. Several tributaries are showing damage from sewage, overloaded by partly treated sewage, or because accumulation of industrial chemicals is quite serious. In general, the health of the bay over the last 40 years as far as we can document it, is deteriorating. We believe that more recent regulation and accompanying enforcement based on increased learning is slowing down that damage. New companies are coming in with much stronger control and regulation and restriction. We still have serious trouble with leftover problems from the older installations, which makes the picture somewhat worse but still highly productive.

Mrs. **Schneider**. I thank you very much, and unless there are any other comments that you might be interested in leaving with us, we will call this to a close.

Dr. **Cronin**. I will be glad to respond to questions.

Mrs. **Schneider**. I am sure there will be some. Thank you very much.

Dr. **Evans**. I will provide you with a more specific answer to your last question on the Water Quality Agreement by mail.

Mrs. **Schneider**. That would be greatly appreciated.

Thank you very much.

The hearing will adjourn.

[Whereupon, at 4:30 p.m., the hearing was adjourned.]

FISCAL YEAR 1983 NOAA AUTHORIZATION

WEDNESDAY, MARCH 3, 1982

House of Representatives,
Committee on Science and Technology,
Subcommittee on Natural Resources, Agriculture
Research, and Environment,
Washington, D.C.

The subcommittee met, pursuant to notice, at 2:05 p.m., in room 2318, Rayburn House Office Building, Hon. James H. Scheuer (chairman of the subcommittee) presiding.

Present: Representatives Scheuer, Blanchard, Brown, Winn, Schneider, and Sensenbrenner.

Staff present: George Kopp, staff director; Bob Palmer, science consultant; Maryanne Bach, minority technical consultant; and Kim Moses, staff assistant.

[The opening statements of Mr. Scheuer and Mr. Carney follow:]

OPENING STATEMENT
JAMES H. SCHEUER
MARCH 3, 1982

THE SUBCOMMITTEE WILL COME TO ORDER.

TODAY WE ARE CONTINUING OUR AUTHORIZATION HEARINGS ON THE FY 1983 BUDGET REQUEST FOR THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION.

WE INTEND TO EXAMINE IN A COMPREHENSIVE MANNER THE OPERATIONS AND RESEARCH ASSOCIATED WITH NOAA'S ATMOSPHERIC, CLIMATIC, AND OCEAN POLLUTION PROGRAMS.

INCLUDED IN THESE AREAS ARE A VERY BROAD RANGE OF ACTIVITIES, INCLUDING THE NATIONAL WEATHER SERVICE, THE ENVIRONMENTAL DATA AND

INFORMATION SERVICE, WEATHER SATELLITES, WEATHER MODIFICATION RESEARCH, ACID RAIN RESEARCH, GREAT LAKES RESEARCH, CLIMATE ACTIVITIES, MONITORING OF THE "GREENHOUSE EFFECT", AND OCEAN POLLUTION RESEARCH AND MONITORING.

THIS SUBCOMMITTEE HAS ALREADY HELD TWO DAYS OF HEARINGS THIS YEAR WITH NON-AGENCY WITNESSES ON NOAA'S FY 1983 BUDGET PROPOSAL.

IN THE COURSE OF THESE HEARINGS, WE HAVE BEEN IMPRESSED WITH THE SCOPE AND QUALITY OF NOAA'S ATMOSPHERIC AND OCEANIC ACTIVITIES, AND WITH THE EXTENT TO WHICH THE PUBLIC DEPENDS UPON THAT AGENCY'S RESEARCH AND SERVICES.

IT IS CLEAR THAT THE ADMINISTRATION'S BUDGET REQUEST WOULD CURTAIL OR CUT BACK ON A NUMBER OF THESE ACTIVITIES, RANGING FROM RESEARCH ON POLLUTION IN THE OCEANS AND THE GREAT LAKES TO THE MONITORING OF SOLAR DISTURBANCES.

FURTHER, INHERENT IN THIS BUDGET REQUEST ARE A NUMBER OF IMPORTANT POLICY QUESTIONS THAT THE CONGRESS WILL HAVE ADDRESS, INCLUDING THE POTENTIAL ROLE OF THE PRIVATE SECTOR IN PROVIDING SATELLITE DATA, THE MAINTENANCE BY THE GOVERNMENT OF SO-CALLED SPECIALIZED WEATHER SERVICES, AND THE RELATIVE ROLES OF THE FEDERAL GOVERNMENT, THE STATES, AND INDUSTRY IN PROVIDING ESSENTIAL ATMOSPHERIC AND OCEANIC RESEARCH.

WE LOOK FORWARD TO HEARING THE TESTIMONY OF DR. JOHN BYRNE, THE ADMINISTRATOR OF NOAA, AND TO QUESTIONING HIM ON THE POLICY IMPLICATIONS OF THE FY 1983 BUDGET PROPOSAL FOR HIS AGENCY.

BEFORE WE HEAR FROM DR. BYRNE, HOWEVER, WE WILL HAVE THE DISTINCT PLEASURE OF RECEIVING TESTIMONY FROM FOUR OF OUR DISTINGUISHED COLLEAGUES REGARDING THE NOAA BUDGET.

WE WILL HEAR FROM HOUSE MAJORITY LEADER JIM WRIGHT OF TEXAS, CONGRESSMAN DAVID BOWEN OF MISSISSIPPI, CONGRESSMAN FLOYD FITHIAN OF INDIANA, AND CONGRESSMAN RAY KOGOVSEK OF COLORADO.

MR. CARNEY, DO YOU HAVE ANY OPENING COMMENTS BEFORE WE COMMENCE THE HEARINGS?

OPENING STATEMENT

HONORABLE WILLIAM CARNEY

Ranking Minority Member, Subcommittee on Natural Resources,
Agricultural Research and Environment

March 3, 1982

Thank you, Mr. Chairman. Today we are pleased to have before this Subcommittee the Administrator of the National Oceanic and Atmospheric Administrations, Dr. John V. Byrne to present the Reagan Administration's budget for the coming year. At this time last year, circumstances were somewhat different. The NOAA Administrator had not been confirmed by the Senate and the NOAA budget had fared better than many federal agencies that were before this committee.

The FY1983 NOAA R&D budget has cuts estimating in the range of 30-45% [illegible] those activities under the jurisdiction of this committee. Received $498.3 Million in FY1982 appropriations. The FY1983 request is $489.1 Million (12% reduction from current level of services).

Over the past two weeks, this Subcommittee has heard from well over a dozen highly qualified witnesses who have provided their professional insight into the role of the Federal Government, State, and Private Industry in supporting research. Much concern has been expressed over the proposed budget cuts. This committee has been and will continue to examine in a comprehensive manner the operations and research associated with NOAA's atmospheric, climate and ocean pollution programs. These areas include the National Weather Service, the Environmental Data and Information Service, weather modification research, ACID RAIN LEGISLATION, GREAT LAKES RESEARCH, OCEAN POLLUTION RESEARCH AND MONITORING AND CLIMATE ACTIVITIES.

NOAA RESEARCH AND SERVICE ACTIVITIES PROVIDE ESSENTIAL INFORMATION USED NATIONALLY AND INTERNATIONALLY. WE ARE HERE TO INSURE THAT THE MOST ESSENTIAL OF THESE ACTIVITIES ARE CONTINUED.

WE ARE IN A PERIOD OF NECESSARY ECONOMIC RECOVERY, WHERE THE FEDERAL GOVERNMENT MUST REASSESS THE ROLE AND PRIORITIES OF ITS AGENCIES. THIS IS A NATION OF TREMENDOUS STRENGTH AND LEADERSHIP. YET, WE ARE ALSO A NATION WHICH HAS BEEN BURDENED BY BUREAUCRATIC WASTE AND ONE WITH AN ESTIMATED NATIONAL DEFICIT FOR FY1983 OF 90-120 BILLION DOLLARS.

MR. CHAIRMAN, WE HAVE SEVERAL DISTINGUISHED WITNESSES HERE TODAY AND WITHOUT FURTHER DELAY, I YEILD BACK TO YOU.

Mr. SCHEUER. The subcommittee will come to order.

Today we are continuing our authorization hearings on the fiscal year 1983 budget request for the National Oceanic and Atmospheric Administration.

We intend to examine, in as comprehensive a way as possible, the operations and research associated with NOAA's atmospheric, climatic, and ocean pollution programs.

Included in these areas are a very broad range of activities, including the National Weather Service, the Environmental Data and Information Service, weather satellites, weather modification research, acid rain research, Great Lakes research, climate activities, monitoring of the "greenhouse effect"—the carbon dioxide effect, and ocean pollution research and monitoring in general.

We have already held 2 days of hearings with non-Agency witnesses, and today, after we hear from several distinguished Members of Congress, we will hear directly from the Administration of NOAA.

During these hearings we have been very much impressed with the scope and quality of NOAA's atmospheric and oceanic activities and with the degree to which the public strongly depends on that Agency's research and services.

It is clear that the administration's budget request would curtail or cut back on a number of these activities, ranging from research on pollution in the oceans and the Great Lakes to the monitoring of solar disturbances.

Furthermore, inherent in this budget request are a number of important public policy questions which Congress will have to address, including the potential role of the private sector in research and development, the maintenance by the Government of the so-called specialized weather services, the relative roles of the Federal

Government, the State governments, and industry in providing essential atmospheric and oceanic research.

We very much look forward to hearing the testimony of Dr. John Byrne, the Administrator of NOAA, telling us about the policy implications of the 1983 fiscal year budget proposal for his Agency.

However, before we hear from Dr. Byrne, we have the distinct pleasure of receiving testimony from four very distinguished Members of Congress. We will hear first from Majority Leader Jim Wright of Texas, and then we will hear from Congressman Dave Bowen of Mississippi, Congressman Floyd Fithian of Indiana, and Congressman Ray Kogovsek of Colorado.

We will ask unanimous consent that, when Mr. Carney of New York comes, we ask him to make any remarks that he wishes to make.

In the meantime, we will ask our distinguished Majority Leader to come front and center and give us his views on the fiscal year 1983 NOAA budget.

Mr. BROWN. Mr. Chairman.

Mr. SCHEUER. I am sorry. Congressman Brown.

Mr. BROWN. Could I ask unanimous consent to insert an important statement which verifies everything you have said right after your statement?

Mr. SCHEUER. Well, I would like you to make the statement. Would you like to make it?

Mr. BROWN. No, thank you.

Mr. SCHEUER. We would be happy to have you make it.

Mr. BROWN. I would rather hear from Mr. Wright.

Mr. SCHEUER. OK. Congressman Brown's statement will be placed in the record at this point, without objection.

[The opening statement of Congressman Brown follows:]

OPENING STATEMENT OF CONGRESSMAN GEORGE E. BROWN, JR. (CA.-36TH)

Mr. Chairman, I appreciate the opportunity to comment on the Administration's proposed FY 1983 budget and some of the issues surrounding this proposal.

Although I am particularly concerned with aspects of NOAA's proposal relating to the National Weather Service, specifically the Agriculture Weather Service and the Fruit Frost Programs, I am generally disturbed at what appears to be negligence with regard to ensuring a continuous high level of quality for NOAA programs.

At a time when federal agencies are being asked to cut back on spending, I certainly think NOAA ought to be asked to cooperate. But without ensuring continued high quality service, and an understanding of how to achieve that under a restrained budget, as one witness, Dr. Robert White put it, we are possibly confusing ". . . efficiency with effectiveness . . .". I think that we all agree that the services provided under the National Weather Service are valuable and have been provided in the excellent operation by NOAA. The proposal before us is to terminate these programs, with little regard that I can discern, for the viable continuation of these programs beyond making the assumption that they will be picked up by the private sector. Have the costs of replacing these programs or running them differently been considered? Can the private sector or other agencies pick up the responsibility for the same cost, or more importantly, with the same quality to the dispersed customers of the service?

In hearings before this Subcommittee last session, for example, estimated annual crop-loss savings to citrus alone in California amounted to approximately $70 million. The Agricultural Weather Service Program provided an estimated return of $20-$30 in crop and livestock savings for every dollar spent on the program. In NOAA budget documents the statement is made that after these programs are terminated, "the general public weather forecasts and warnings prepared now by the

National Weather Service will continue to be available for use by fruit and vegetable growers . . .". This is hardly compensation for loss of a specialized service.

I have other concerns relating to the proposed NOAA budget. Delays in NEXRAD procurement and the proposals relating to the satellite and remote sensing systems, are all very important. These need to be examined closely to ensure proper coordination of NOAA's activities with other agencies and the private sector.

I look forward to hearing from the Administrator. I thank the Chairman.

Mr. SCHEUER. We invite the Majority Leader to address us. We yield the gentleman such time as he may need.

STATEMENT OF HON. JIM WRIGHT, U.S. REPRESENTATIVE, STATE OF TEXAS

Mr. WRIGHT. Mr. Chairman, thank you very much. I am extremely grateful for your hospitality and for the invitation that you and your subcommittee have extended.

I want to address a matter of very great concern to the citizens of the southern and southwestern portions of the United States who depend for the protection of their lives and property upon the National Weather Service.

According to the budget recommendations submitted to Congress by the National Oceanic and Atmospheric Administration, the National Weather Service's southern regional headquarters, located in Fort Worth, Tex., currently serving a 10-State area and Puerto Rico, would be closed. It is proposed that future weather services for this entire area should be provided by regional centers as far away as Kansas City and New York.

In my opinion, there would be very little real savings possible from an action of this kind, but the resultant losses in efficiency and performance could provide a great disservice to the American people.

The public relies on the National Weather Service for State and local forecasts, for disaster preparedness, for hurricane and severe local weather storm warnings, for winter weather warnings, for agricultural weather services, for flying information, and for many other weather service programs.

The National Weather Service's budget for operations has always been an austere one. Staff personnel throughout the Nation are actually fewer than they were in September 1978, when they were slightly in excess of 5,000; now they are slightly fewer than 5,000.

There are now but four regional centers, and further consolidation, it seems to me, Mr. Chairman, can only result in increased costs, in travel and long-distance communication, and in decreased services.

The 10-State area monitored by the southern regional headquarters has a commonality of weather problems. I am thinking in particular of citrus crops and crops of that kind, in which the failure of a weather warning system or its tardiness not only could destroy a crop for a year, but if the weather were sufficiently severe along the lower coast of Texas and in Florida in particular, it could indeed kill the trees and destroy a lifetime's savings.

I am thinking also of offshore oil rigs in the Gulf of Mexico. We have very recently seen a disaster during a storm in the North Atlantic, when the Mobil "Ranger"went down with all hands. That reminds us of how vital prompt, efficient, and reliable weather information can be to the brave men who work at sea to bring ashore our vital natural resources.

The southern regional office at Fort Worth has pioneered in disaster preparedness and severe weather prediction techniques for the southern States. The majority of the Nation's killer tornadoes occur in that southern region, and virtually all hurricanes make landfalls along the southern region's Gulf and Atlantic coasts.

The high cost of transferring experienced weather personnel from this Southern regional headquarters to other remote and distant cities is yet another argument, I think, against closing the Southern regional headquarters.

While it is the ostensible aim of this proposed termination to cut costs, and while I am supportive of cutting costs wherever they are practical, I just simply do not believe that closing this Fort Worth regional center is going to save very much money, and certainly it is not going to save enough money to justify the vast reductions in service to the public and the potential economic losses which the public could suffer as a result. I think it is false economy.

There is one area in which some cost reductions in weather services would be possible, it seems to me. According to a report issued by the General Accounting Office, it would not involve closing down one of the regional headquarters offices.

The General Accounting Office has looked at the National Weather Service's proposed new automation of field operations and services system and has found it severely wanting. That is a computerized weather information service into which the National Weather Service, according to the GAO, already has put more than $100 million. That is $22 million over the budget. The GAO says that this automated system still is not able to meet its original requirements.

The National Weather Service apparently intends to install this system, but I have here a report from the Comptroller General, who points out that it is at least 5 years behind schedule and that it has cost $100 million—$22 million over its original budget. The GAO states its recommendation that the Service should reappraise AFOS and subject it to further testing, and that it ought to prepare a comprehensive plan, including cost-benefit analysis, before implementing AFOS nationwide, and that, if it is to be implemented, it would just be an interim system, and the Service immediately ought to commit resources to developing a replacement system.

So it seems to me that this system is scarcely worth the money that the taxpayers are going to put into it. It seems to me that a far better place to save money, rather than closing down regional centers such as the one in Fort Worth, might simply be to close down the exhorbitant computer system that does not work. I am hoping that later on in these hearings NOAA officials will let us have their own views on that subject.

Less than a year ago a NOAA study recommended, not that the regional headquarters in Fort Worth be closed, but rather that it be expanded to become a national Oceanic and Atmospheric Administration regional headquarters as well. That makes a lot more sense to me, and I am hoping that NOAA officials will talk to the subcommittee about that too.

Mr. Chairman, that concludes the testimony. I am grateful to the subcommittee for your indulgence and your kind extension of this time to me.

[The prepared statement of Mr. Wright follows:]

REMARKS OF HOUSE MAJORITY LEADER

JIM WRIGHT

BEFORE THE HOUSE SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE AND ENVIRONMENT

Wednesday, March 3, 1982

Mr. Chairman: Thank you and the members of your committee for inviting me here. Today I would like to address a matter of great concern to citizens of the Southern and Southwestern portions of the United States who depend, for the protection of their lives and property, on the National Weather Service.

According to the budget submitted to Congress by the National Oceanic and Atmospheric Administration, the National Weather Service's Southern Regional Headquarters in Fort Worth, Texas, which currently serves a 10-state area and Puerto Rico, is to be closed. It is proposed that future weather services for this entire area be provided by regional centers as distant as Kansas City and New York.

In my opinion, very little real savings in money would result from this action, and the resultant losses in efficiency and performance would be a great disservice to the public, which relies on the National Weather Service for state and local forecasts, disaster preparedness, hurricane and severe local storm warnings, winter weather warnings, agricultural weather services, flying information and many other weather service programs.

The National Weather Service's budget for operations has always been austere. Staff personnel nationwide has dropped from 5089 in September, 1978, to 4967 as of last September. There are now but four regional centers in the contiguous states and further consolidation can only result in increased costs in travel and long-distance communication.

The 10-state area monitored by the Southern Regional Headquarters has a commonality of weather problems. I am thinking in particular of our offshore oil rigs in the Gulf of Mexico. When we have so recently seen a disaster during a storm in the North Atlantic, when the Mobile Ranger went down with all hands, we are reminded of how vital prompt, efficient, reliable weather information is to the brave men who work at sea to bring ashore our vital natural resources.

Fort Worth has pioneered in disaster preparedness and severe weather prediction techniques for the southern states. The majority of the nation's killer tornadoes occur in the Southern Region and virtually all hurricanes make landfalls along the Southern Region's Gulf and Atlantic coasts. The Kansas City and New York Regions have little or no experience with hurricanes. The high cost of transferring experienced Fort Worth weather personnel to other cities is yet another argument against closing Fort Worth.

While it is the aim of this proposed close-down to cut costs, and while I am always supportive of cutting costs where and when practical, I do not believe that closing Fort Worth will save much money -- and certainly not enought to justify the vast reductions in service to the public which would be the result.

There is, however an area where some cost reductions in weather services are possible, according to a report issued by the General Accounting Office. The GAO has looked at the National Weather Service's new Automation of Field Operations and Services system and found it severely wanting. This is a computerized weather information service into which the NWS has put $100 million

-- some $22 million over budget. The GAO says that this automated system still cannot meet its original requirements.

The NWS still plans to install this system, despite a GAO recommendation that it do a cost/benefit analysis before going ahead. In others words, is this system worth the money the taxpayers have put into it? Perhaps a better place than closing Fort Worth to save money might simply be the closing down of the exorbitant computer system that does not seem to work. I am hoping that later on in these hearings, NOAA officials will let us have their own views on this subject.

Less than a year ago, a NOAA study recommended not that the regional headquarters in Fort Worth be closed but rather that it be expanded to become a National Oceanic and Atmospheric Administration regional headquarters, as well. That makes a lot of sense to me and I am hoping that NOAA officials will talk to the committee about that, too.

Thank you.

Mr. SCHEUER. We thank you very, very much for your testimony, Mr. Majority Leader. We thank you for your eloquence and for the insights that you have shared with us. You can be very sure that we will be addressing the appropriate questions to Dr. Byrne and the other officials as they testify.

Mrs. Schneider.

Mrs. SCHNEIDER. I have no questions, thank you.

Mr. SCHEUER. Congressman Brown of California.

Mr. BROWN. I have no questions.

Mr. SCHEUER. Thank you very much, Mr. Majority Leader. We are grateful to you.

Mr. WRIGHT. Thank you, Mr. Chairman.

Mr. SCHEUER. Next, my friend, my colleague, and my neighbor, Congressman David Bowen of Mississippi.

Congressman, I am happy to have you here, and I yield to you such time as you may need.

STATEMENT OF HON. DAVID BOWEN, U.S. REPRESENTATIVE, STATE OF MISSISSIPPI

Mr. BOWEN. Thank you, Mr. Chairman. I appreciate your hospitality and that of the subcommittee.

I would like to submit my full statement for the record and speak to a more limited portion of it at this time.

I share very strongly the sentiments just expressed by our distinguished Majority Leader, although I am here today to let you know of my special distress and that of America's farmers about the proposed extinction of the National Weather Service's Agricultural Weather Service program.

It is indeed very difficult to understand why such a valuable and cost-effective program as this, which provides such a unique contribution to what is indeed one of our most depressed industries—agriculture—should be selected for total elimination.

As we all know, agriculture in this country has been threatened by a more severe degree of inflated costs that most other sectors of our economy because of the increase in prices of agricultural chemicals, fuels, and other petroleum-based products, as well as being hit by depressed prices worldwide.

In the face of this kind of adversity, I happen to believe that one of the most effective tools that is available to American farmers to cope with the especially difficult problem of weather conditions is provided by NOAA's Agricultural Weather Service program.

Studies that were recently conducted in my own State indicate that farmers have been able to achieve an average of some 7 percent greater cash farm receipts as a result of eliminating preventable weather losses through the services provided by NOAA's Agricultural Weather Service.

Among the kinds of services that are provided by NOAA is an analysis of soil temperature and moisture measurements that are very badly needed to establish appropriate planting times, a precise analysis of wind speed and direction that is essential for agricultural aviation if those aerial applicators are to minimize the application of costly agricultural chemicals—and there are a number of reasons we would want to see that done beyond simply a matter of minimizing cost to the farmer—and there is also a direct computer linkage through these NOAA agricultural weather facilities to the Weather Bank of the National Weather Service, thus obtaining far more detailed information, which is required for agricultural purposes, than general weather reports.

There has also been the establishment of a number of computer models that have provided help to farmers. One of them has been established through a facility located in my congressional district, at Stoneville, Miss. That analysis provides information to about 30,000 rice growers who are farming some 2,500,000 acres of land on when to irrigate, how to go about controlling pests and weeds, when to schedule harvests, and a number of other matters that are weather connected.

Ultimately, the very essential 24-hour agricultural weather radio is badly needed to take this information and get it out to the farmers.

We are pleased that our commercial sources of weather information are still available and do an adequate job, though a limited one from the perspective of the farmer's needs. It is only through the kind of research and the provision of this information through the 24-hour weather radio that farmers are able to get what they need for their purposes.

NOAA has estimated—and this has been confirmed by independent sources—that their weather forecasts save American farmers at least $750 million a year in production costs of the major farm commodities, such as wheat, corn, soybeans, cotton, fruit, and vegetables. In the kind of free market that we have, these saving of course translate very directly into higher production and lower prices for consumers.

It seems to me very short sighted to try to eliminate a program that so very clearly benefits both farmers and consumers in our Nation. As a consequence, I strongly urge the subcommittee to support the authorization for the NOAA Agricultural Weather Service and restore the funds which the Administration has requested cutting, which amount to about $1 million, a rather limited amount compared with a number of the other outlays that you will have to consider.

I certainly urge you, Mr. Chairman and members of the subcommittee, to do all that you can to support funding of this program for fiscal year 1983.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Bowen follows:]

Statement of Congressman David R. Bowen
before the
Subcommittee on Natural Resources,
Agriculture Research and Environment
of the
Committee on Science and Technology

Mr. Chairman and Members of the Subcommittee, I appreciate the opportunity to testify before you today.

Mr. Chairman, I was greatly distressed to learn that the Administration has targeted the National Weather Service's Agricultural Weather Service Program for extinction. Although I understand the need for budget restraints at this time, I find it very difficult to understand why a valuable and cost-effective program such as this, which makes such a unique contribution to one of our most depressed industries, agriculture, is selected for total elimination.

In recent years, we have been threatened by shortages of fuel, agricultural chemicals, and other petroleum-based products. These and other factors have contributed to a much greater inflationary impact on the production costs of agriculture than most other sectors of the American economy, with agriculture already subject to depressed worldwide prices.

In the face of such adversity one of the most effective tools available for American farmers to cope with the difficult problem of weather conditions is provided by the NOAA Agricultural Weather Service Program. Studies recently conducted in my state indicate that farmers have been able to achieve an average of seven percent greater cash farm receipts as a result of eliminating preventable weather losses through services provided by the NOAA Agricultural Weather Service.

Among the services provided by NOAA is a careful analysis of soil temperature and moisture measurements so badly needed to establish appropriate planting times; precise analysis of wind speed and direction, essential for agricultural aviation to minimize the application of costly agricultural chemicals; direct computer linkage through these NOAA facilities to the weather bank of the National Weather Service, thus obtaining far more detailed information needed for agriculture purposes than general weather reports contain; establishment of computer models for use by farmers, such as one prepared at NOAA's Agricultural Weather Service Center in Stoneville, Mississippi, in cooperation with area universities, which is used by 30,000 rice growers farming 2.5 million acres in Mississippi, Arkansas, and Louisiana, providing information on when to irrigate, control pests and weeds, and when to schedule harvests; and ultimately the all-important twenty-four-hour agricultural weather radio, which is used to supplement the information provided by commercial television and radio stations for farmers. General weather information provided by these commercial sources is inadequate for agricultural purposes, though helpful, and must be supplemented by the more precise and substantially different kinds of analyses of data prepared by the NOAA Agricultural Weather Service.

It is estimated by NOAA, and confirmed by independent sources, that their weather forecasts save U.S. farmers at least $750 million a year in production costs of major farm commodities such as wheat, corn, soybeans, cotton, fruit and vegetables, and in a free market such as we have, these savings translate into higher production and lower prices for consumers. It seems shortsighted to me to eliminate a program that so clearly benefits our nation's farmers and our nation's consumers as well. Accordingly, I strongly urge you to support the authorization for the NOAA Agricultural Weather Service, and I ask that you do everything you can to encourage funding for this program in FY 1983.

Mr. SCHEUER. Thank you very much, Congressman.

Do you believe that a nearby National Weather Service installation could replace the activities of the Stoneville station?

Mr. BOWEN. Unfortunately, that is not the case. We badly need a full-scale operational National Weather Service. We do not need to see these stations close down, and I certainly do support the testimony of those witnesses who will be calling for full funding in that area.

What the agricultural weather program does is to take a great deal of information that is general in character but has not been translated into terms that are effectively usable by farmers.

For example, the Weather Bank of the National Weather Service does not really utilize more than perhaps a third of the information there, but there is a lot of detailed data collected which can then be plugged into the computers of these Agricultural Weather Service stations and can be applied very specifically for agricultural needs in those regions.

Take other kinds of research—soil temperatures that are needed, measurements of moisture there—that have to be determined with a fairly high degree of precision, to determine just when to plant, so that germination will take place in the right sort of way. This is something that the National Weather Service is not concerned with. This is something that requires an agricultural weather service. It is simply examples such as this that I think fully justify the modest outlay needed to continue the Agricultural Weather Service program, Mr. Chairman.

Mr. SCHEUER. I appreciate that answer. As you know, we Democrats are committed to cost effectiveness in Government services, and we also believe in letting the private sector and free market forces provide whatever they can provide. Do you think that the private sector can provide these services?

Mr. BOWEN. Some services are already being provided that are useful. For example, a farmer can look at his local television station and watch a weather radar scope that will show him some things that he needs to know, but they will not be able to provide the precise information for a single county or the exact details of wind direction and velocity that, for example, agricultural aviation must have to determine how much of a chemical to release, at what time, and whether wind shifts are likely to take place in a particular region. Things of this sort simply are not designed to be provided through commercial sources, such as commercial television and radio. Nor does the National Weather Service itself address this particular problem.

This has to be handled by a specialized service designed to take the data that are collected through the National Weather Service and other sources, and then they must extrapolate from that the specific kinds of information that farmers need.

As I say, I agree very strongly with your position, Mr. Chairman, that we want to save every single dollar in Federal outlays that we can, but a program which costs $1 million and has resulted in a saving per annum of some $750 million to farmers in this country can only be regarded as highly cost effective.

Mr. SCHEUER. So you do not see any substitute for the specialized NOAA service?

Mr. **Bowen**. Absolutely not, Mr. Chairman.

Mr. **Scheuer**. Thank you very much.

My colleague, Mrs. Schneider of Rhode Island.

Mrs. **Schneider**. I would like to pick up on the enthusiasm that we obviously share for the free market and private enterprise. Given our desire to cut back on excessive Federal spending, it is necessary at all times to determine priorities I would like to ask you this:

In reviewing the NOAA budget, it is my understanding that the Agricultural Weather Service in the priority list comes below the warning and forecasting priorities, which are directed toward the saving of life and limb.

If you were the administrator of NOAA and you had to make your decisions based on priorities, if you had to make some trade offs and if you had to look at the Nation as a whole rather than your district, would you not see the importance of a greater emphasis on dollars being spent on warning and forecasting?

Mr. **Bowen**. Those are very good points, Mrs. Schneider, and I would simply say that of course I am concerned about this service for the entire Nation, since it is not simply a closure of certain regional centers that we are discussing. We are talking about a complete termination and closing down of the entire operation nationwide.

I certainly would be the first to agree that saving human lives, for example through hurricane and tornado forecasting obviously would take a certain kind of priority over the economic benefits to be achieved, although we are talking about two different kinds of needs which our society and our economy have.

Something which saves hundreds of millions of dollars in income, income which is paying tax revenues into the Treasury to finance this very kind of program, which costs such a modest amount of investment in terms of Federal outlays, I think might be regarded in a different light.

But I do hope very much that we will be able to make the task for the Administrator of NOAA much less complicated, so that he will not have to make that decision—that we will provide the funds and provide the statutory instruction that will allow him to go ahead and administer both of these very important services.

Mrs. **Schneider**. If we do that, then we are not really cutting back in our budget, and, we are working within a very tight constraint. I wonder, why the private sector could not take on this responsibility?

Mr. **Bowen**. That would be an interesting prospect. I do not know of anybody who is doing it. There is an occasional agricultural weather forecast that comes over commercial radio or television, but they do not have the facilities. They do not have the research tools, the data processing equipment, or the computer linkups with the weather bank of the National Weather Service to be able to obtain the information that farmers really need.

That is why we have got a system in place, and our trying to somehow put commercial radio and television stations into a position to do this would, in my judgment, be extremely difficult.

I agree with you, it is a matter of counting dollars, and I am simply saying that, as you look at the benefits to be obtained for the investment of $1 million in Federal tax revenues in terms of the vast gain that is achieved by agriculture, so badly needed by that depressed sector of our economy, this would be a reasonable judgment for this subcommittee to make, and that outlay is justified.

Mrs. SCHNEIDER. One final question that this subcommittee does not have jurisdiction over but is in response to my own curiosity. Are you a supporter of rice subsidies?

Mr. BOWEN. I voted for the administration's farm bill. I helped write it, and I served on the conference committee. That legislation, very strongly supported by President Reagan and Secretary of Agriculture Block, does contain a rice program within it.

In fact, I am the chairman of the Subcommittee on Cotton, Rice, and Sugar of the Agriculture Committee of the House. So I was very pleased to join hands with President Reagan and the administration in support of the farm bill that we passed last year.

Mrs. SCHNEIDER. Let me just state that, as a new legislator, my emphasis is on consistency. In my enthusiasm for the free market, as you refer to it, translating into higher production and lower prices for consumers in your testimony, and in looking at overall budgets as a Representative looking out for the whole Nation, I see some antitheses in your testimony and your support of some of the farm subsidies. I would just like to go on record as making that distinction.

Mr. BOWEN. That is a sentiment that I know is shared by some of our colleagues. I have had a number of discussions with them about this. It is a view which, as you understand, is not fully shared by our President, our Secretary of Agriculture, and our leadership in this Republican administration, nor by Democratic administrations.

The feeling is that farmers have been thrown open to a competitive world marketing situation in which they are not restricted in their acreage—they are not told they cannot plant more than a specific amount, which was what we once had as a part of our agricultural statutes. Rather, they are told to grow for the world market, a system which was designed for the sake of consumers, to insure that you would have the large production that our urban areas and consuming population must have.

This large production has resulted in a falloff in the prices of most agricultural commodities. Although I would say that this is not always reflected as directly as both you and I would like to see in grocery store prices for consumers, there are a lot of things that happen to that agricultural production from the time it leaves the farm until the time it reaches that grocery shelf.

I believe that a service, such as this Agricultural Weather Service provides, that enables farmers to increase production and hold down production costs, can only be translated into better commodities and better food and fiber for consumers at lower prices.

There is a simple safety net—if you prefer to use a term that originated elsewhere—provided for farmers, whether they be growing wheat, corn, cotton, or rice, or a number of other commodities.

Occasionally, when you have a catastrophic fall in price as a result of overproduction worldwide—which is what we have today—then it is necessary for the Government to make this occasional but unusual outlay known as a deficiency payment, to which you refer, and that is happening in some of our commodities this year, but fortunately it does not happen very often.

We hope that that kind of thing is unnecessary, but the legislation, which I have supported and have referred to, does make that provision for assistance under those unusual circumstances.

Mrs. **SCHNEIDER**. Thank you very much.

Thank you, Mr. Chairman.

Mr. **SCHEUER**. Thank you.

Congressman George Brown.

Mr. **BROWN**. I have no questions, Mr. Chairman.

Mr. **SCHEUER**. Thank you very much, Congressman. Your testimony has been very much appreciated. We are glad to have had you here.

Mr. **BOWEN**. Thank you, Mr. Chairman.

Mr. **SCHEUER**. Now we will hear from Congressman Floyd Fithian of Indiana.

We are happy to have you here, Congressman. We yield to you such time as you may need.

STATEMENT OF HON. FLOYD FITHIAN, U.S. REPRESENTATIVE, STATE OF INDIANA

Mr. **FITHIAN**. Thank you, Mr Chairman, and let me thank the members of the subcommittee also for bringing this opportunity to us to look at the budget in one small slice.

The proposed elimination of the four Agricultural Weather Centers would, in my judgment, leave a drastic void in the agricultural-related weather data that are currently being provided by these centers. If this proposed cut goes through, it will mean higher crop losses for the farmers and higher grocery prices for the consumers. It is about as simple as that.

The Agricultural Weather Center located in West Lafayette, Ind., currently serves a five-State area composed of Ohio, Illinois, Michigan, Kentucky, and Indiana.

The annual net worth of agricultural production in that region, the heart of the farm belt, is estimated to exceed $15 billion. The total annual impact of weather and weather-related loss is nearly 5 percent of that total production, for a total estimated loss of $750 million. In Indiana alone, it is estimated to contribute roughly $200 million, or well over one quarter of the total weather-related loss in the region.

Purdue University agronomists estimate that the agricultural weather information supplied by the centers are effective in eliminating about 10 percent, or $75 million, of the estimated $750 million loss to the farming community. This translates into a savings for Indiana alone of $20 million.

A large portion of this savings is made possible through the twice-daily agricultural weather advisory services.

If I may digress from the prepared text to Mrs. Schneider's question, the plain fact of the matter is that the commercial meteorologists are not trained at present in order to provide the kind of data that is especially tailored to agriculture. So it is not a question of whether or not some commercial venture could provide this; it is a question of whether at this time and for the foreseeable future it will be provided at all. That is what this budget really means.

These services include reports on the effect of weather on crops and livestock. I do not think we should measure this against human life. Obviously that has to take priority. It should be measured on a cost-effectiveness basis within the agricultural sector itself.

The reports also include operational data, such as soil moisture, freeze depth, and several special forecasts, but even more important than those, I suspect, is that which my colleague, David Bowen, spoke to, and that is the pest disease management—the so-called FACTS program.

Improper application of pest control due to the lack of accurate weather data can cost the farmer dearly. We figured it out for the average Indiana farmer, who would have to pay about $3,300 for an extra pesticide application should he attempt to apply at a time when the wind conditions, unforecast, were not favorable. This estimate is based on the 1978 census of agriculture.

The roughly $300,000 operating costs of the Midwest Agricultural Weather Service Center are less than one-half of 1 percent of the $75 million saved.

I would ask the members of the subcommittee to just think back and compute various programs in the Federal Government. I think we must look at these, not within a narrow slice of the budget, but budget-wide, across the board.

How many areas in the Federal budget can it really truly be said are cost effective at the rate of one-half of 1 percent to the $75 million saved? I do not know very many.

Now, budget cuts like these may make some sense to some chair-bound OMB bureaucrat—which is, I suspect, where this came from—but to the thousands of Hoosier farmers I represent, who risk losing hundreds of thousands of dollars as a result of inadequate weather information, this is an extremely serious matter and an extraordinarily unwise decision.

In analyzing these figures, it would appear to me that this service is certainly cost effective; no matter from what vantage point one takes it, it is cost effective. Whoever devised this plan simply does not realize the importance of the American farmer to the country.

The administration's shortsighted effort to save $300,000 while placing the burden of a $75 million loss on the American farmer and ultimately, of course, the American consumer is another example of this administration's lack of understanding of the plight of the American farmer, which by now has grown to be a sort of comprehensive misunderstanding of that.

The loss of the Agricultural Weather Service Centers is of major concern to the farmers of my district, to the farmers of Indiana, and to the farmers of the four State areas served.

Private weather services do not and will not report the information that is vital to holding down production costs to the farmer. The last thing that the farmers need in that part of the world is higher production costs.

[The prepared statement of Mr. Fithian follows:]

TESTIMONY OF
THE HONORABLE FLOYD J. FITHIAN, M.C.

Mr. Chairman, I would like to thank you and the members of the subcommittee for the opportunity to testify before you here today on the proposed FY 83 elimination of the Agricultural Weather Service Centers.

The proposed elimination of the four Agricultural Weather Service Centers would leave a drastic void in the agriculturally related weather data that is currently being provided by these centers. If passed, it will mean higher crop losses for our farmers and higher grocery prices for our consumers. In my opinion we can achieve much greater savings elswhere without hurting the American people.

The Agricultural Weather Service Center located in my district, West Lafayette, Indiana, currently serves a five (5) state region composed of Ohio, Illinois, Michigan, Kentucky, and of course Indiana. The annual net worth of agricultural production in this region is estimated to exceed fifteen (15) billion dollars. The total annual impact of weather and weather-related loss is nearly five (5) percent of that total production, or a total estimated loss of $750 million. My home state of Indiana is estimated to contribute roughly $200 million, or well over one fourth of the total weather-related loss in this region.

Purdue University agronomists estimate that the agricultural weather information supplied by the centers are effective in eliminating ten (10) percent or $75 million of the estimated $750 million dollar loss to the farming community. This translates into a savings of over $20 million dollars to the Indiana farmers.

A large portion of this savings is made possible through the twice daily agricultural weather advisory services. These services include reports on the effects the weather can have on crops and livestock. The reports also include operational data such as soil moisture, freeze depth, and several special forecasts. However, even more substantial is the savings due to the pest-disease management and FACTS program. Improper application of pest control due to the lack of accurate weather data can cost the farmer dearly. The average Indiana farmer would have to pay $3,300 for an extra pesticide application. This estimate is based on the 1978 census of Agriculture, which places the average size farm in Indiana at 193 acres, and an estimation of a pesticide application by an Agri-businessman in my district. This program in particular, if eliminated will not be replaced by private enterprise.

The roughly $300,000 dollar operating cost of the Midwest Agricultural Weather Service Center is less than ½ of 1 percent of the $75 million saved by farmers and consumers. Budget cuts like these may make sense to some chairbound OMB bureaucrat. But, to the thousands of Hoosier farmers I represent, who risk losing hundreds of thousands of dollars as a result of inadequate weather information, this is an extremly serious matter. In analyzing these figures, it would appear to me that this service is certainly cost effective.

Whoever devised this plan does not realize how important the American farmer is to our country. The Administration's short sighted effort to save $300,000, while placing the burden of a $75 million loss on the American farmer and consumer, is another example of this Administration's lack of understanding into the plight of the American farmer.

The loss of these Agricultural Weather Service Centers is of major concern to the farmers of my district. Private weather services do not and will not report the information that is vital to holding down production costs to the farmer. The last thing our farmers need is higher production costs.

Mr. **Scheuer**. Thank you very much.

Congressman Blanchard, do you have any questions for Congressman Fithian?

Mr. **Blanchard**. No, Mr. Chairman. I share your concerns, Floyd, and I want to thank you for being with us today.

Mr. **Fithian**. Thank you.

Mr. **Scheuer**. Congresswoman Schneider.

Mrs. **Schneider**. I am wondering if you could enlighten this panel. It is my understanding that all of the States that do have agricultural extension services work in cooperation with the USDA and with the NOAA Weather Service. I was wondering what the extension service might be doing in this regard in your district in Indiana.

Mr. **Fithian**. The county extension agent is a vital part of the whole agricultural establishment, and all kinds of information—seminars, going out to service individual farmers or groups of farmers who produce like commodities—is a constant part of that. But no one would argue that the county agents, as effective as they are and as well trained as they are, are meteorologists, and no one would argue that they could provide this service as an alternative source.

Mrs. **Schneider**. Have not the States and the Federal Government been working very closely together? Is it not a cooperative arrangement for the Agricultural Weather Service? So would not the States have some knowledge and capability in training in that area?

Mr. **Fithian**. In fact, Purdue University is undergoing an effort, not yet successful, to try to beef up the available expertise in the commercial weather station forecasting, but the information we have is that it is not there.

There is a cooperative effort between States and the USDA with regard to the county extension agents' activities and with regard to other activities within the farm sector, but it does not reach to this level.

If I may say so, this is an area of rather precise expertise, and even the meteorologist, who is a trained meteorologist, is not trained in terms of his or her background and the agricultural necessity of such things as hay drying, for example—which are data that come out—freeze depths, and germination periods. These are agriculturally related, as is it applicable, as Congressman Bowen pointed out, in the aerial spraying concern.

I would hope that, as we look at the budget—if I may just go a little beyond this—we would look at it in its most comprehensive way. I do not think it is a very intelligent approach to say, within one small slice of the budget, that there must be savings made because of some percentage arrived at by somebody to cut. When you do that, you do not weigh the relative merits of one program vis-a-vis another program that may not, in fact, come under NOAA or may not, in fact, come under any particular part of that budget.

No one has been more strenuous in pursuit of a balanced budget than I have in the 7½ years I have been here, but I have never supported a cut which can be so demonstrably proven to have less cost-benefit than this one, and I never will.

Mrs. **Schneider**. Thank you, Mr. Chairman.

Mr. **Scheuer**. Congressman Brown.

Mr. **Brown**. I have no questions, Mr. Chairman.

Mr. **Scheuer**. Thank you very, very much, Floyd.

Mr. **Fithian**. Thank you, Mr. Chairman.

Mr. **Scheuer**. Now we will have our last congressional witness, Congressman Ray Kogovsek of Colorado.

We are happy to have you here, Ray, and we yield you such time as you may need.

STATEMENT OF HON. RAY KOGOVSEK, U.S. REPRESENTATIVE, STATE OF COLORADO

Mr. **Kogovsek**. Thank you, Mr. Chairman and members of the subcommittee; thank you for your time.

I would like to make just a very brief statement, Mr. Chairman, and then, if I might, leave with your subcommittee something that I would like to put in the record, without objection.

Mr. **Scheuer**. It is so ordered.

Mr. **Kogovsek**. Mr. Chairman and members of the subcommittee, the Pueblo and Alamosa weather stations in southern Colorado have received a commitment for continued funding for 1983. We were scheduled for nonfunding for the 1983 budget, but I think we have a commitment for funding.

But while this funding keeps these vital facilities open for 1 more year, it leaves open the possibility of future changes and only maintains them at a minimal operational status.

The Pueblo and the Alamosa weather facilities are an integral part of flight safety and are mandatory for proper aircraft operation in the area. If these facilities were to be eliminated, the southern part of Colorado would not be able to meet the FAA criteria for aircraft instrument approaches to airfields.

These weather facilities provide both ground weather reports at the airports and the forecasts for aircraft approaching the unstable weather region of the Rocky Mountains. If these stations were to be eliminated in the future, southern Colorado would have to rely on weather from the Denver weather station, which has a totally different environment.

One of the main east-west flight corridors passes over the Pueblo-Alamosa area. These weather stations are located in a valley within the Rocky Mountains and can therefore advise of weather variations for these overflights.

The altimeter at the Alamosa versus airfields of the Rockies can differ by several hundred feet, and the great temperature density variations can also severely affect altitude readings.

This information allows for the proper altitude of aircraft flying over or landing within the mountain and plain areas. Many aircraft just stop east of the mountains for fuel and weather briefings before flying over the Continental Divide. If this service were discontinued, it would pose a very serious air traffic hazard.

Additionally, the FAA has proposed the consolidation of several flight service stations in this region, thereby eliminating the alternative source of weather information. This makes the present facilities even more critical.

Both the Pueblo and Alamosa areas have several charter aircraft companies that would undergo immense problems, since they are required to have current ground weather information in order to comply with Government regulations for flight operations.

In the case of Pueblo, if the weather station was closed, the airport would not be able to meet the FAA criteria for a control area. If we do not have a control area, then we do not have the authority to control aircraft in that area, and this could easily lead to the closing of the tower at the Pueblo airport, causing irreparable harm to the local economy.

Without weather reporting facilities at the location, aircraft would be extremely hesitant to land in Pueblo. It would be a kind of Catch-22 situation; the Government would require the aircraft to know the weather in order to land, but they would be eliminating the only source of determining that weather.

The weather stations also provide vital information to area ranchers and farmers. Failure to accurately forecast a storm could result in the devastation of crops and the loss of stock.

Also, crop dusting is a common practice in southern Colorado, and local reports on the wind direction and temperature are imperative.

Mr. Chairman, as I said earlier, I would like to submit my statement for the record. I would also just sum up at this time and indicate that I think we are talking about some false savings here.

From time to time, aircraft that would generally stack up in the Denver Stapleton Airport, which is the fifth busiest airport in the whole United States, during a bad storm in the Rockies are sent to the Pueblo airport. If, in fact, the weather station were closed at the Pueblo airport, which is about 120 miles south of Denver, we would find ourselves with some serious safety problems.

So once again, I think that, in the closing of the two weather stations that concern my district most as far as agriculture is concerned and the entire economy, we are talking about a false economy.

[The prepared statement of Mr. Kogovsek follows:]

The Pueblo and Alamosa weather stations in Colorado have received a commitment for continued funding for FY '83. While this funding keeps these vital facilities open for one more year, it leaves open the possibility of future changes and only maintains them at a minimum operational status.

The Pueblo and Alamosa weather facilities are an integral part of flight safety and are mandatory for proper aircraft operation in this area. If these facilities were to be eliminated, the southern part of Colorado would not be able to meet the FAA criteria for aircraft instrument approaches to airfields. These weather facilities provide both the ground weather reports at the airports and the forecasts for aircraft approaching the unstable weather region of the Rocky Mountains. If these stations were to be eliminated in the future, southern Colorado would have to rely on weather from Denver which has a totally different environment.

One of the main east/west flight corridors passes over the Alamosa area. This weather station is located in a valley within the Rocky Mountains and can therefore advise of the weather variations for these overflights. The altimeter at Alamosa versus airfield east of the Rockies can differ by several hundred feet and the great temperature density variations can also severely affect altitude readings. This information allows for the proper altitude of aircraft flying over or landing within this mountain plain area. Many aircraft stop just east of the mountains for fuel and weather briefings before flying over the mountains and if this service was discontinued it would pose a very serious air traffic hazard. Additionally, the FAA has proposed the consolidation of several flight service stations in this region thereby eliminating the alternative source of weather information. This makes the present facilities even more critical. Both the Pueblo and Alamosa areas have several charter aircraft companies that would undergo immense problemss since they are required to have current ground weather information in order to comply with government regulations for flight operations.

In the case of Pueblo, if the weather station was closed, the airport would not be able to meet the FAA criteria for a control area. If you do not have a control area then you do not have the authority to control aircraft in that area and this could easily lead to the closing of the tower at the Pueblo Aiport, causing irreparable harm to the local economy. Without weather reporting facilities at the location, aircraft would be extremely hesitant to land in Pueblo. It would be a catch-22 situation - the government would require the aircraft to know the weather in order to land, but they would be eliminating the only source of determining the weather.

The weather stations also provide vital information to area ranchers and farmers. Failure to accurately forcecast a storm could result in the devastation of crops and loss of stock. Also, crop dusting is a common practice in southern Colorado and local reports on the wind direction and temperature are imperative.

Mr. **Scheuer**. Congressman Blanchard.

Mr. **Blanchard**. I have no questions. We just intend to work with you, Ray, and appreciate your being here with us to share your views.

Mr. **Kogovsek**. Thank you, Jim.

Mr. **Scheuer**. Mrs. Schneider.

Mrs. **Schneider**. I have no questions, Mr. Chairman.

Mr. **Scheuer**. Congressman Brown.

Mr. **Brown**. I have no questions.

Mr. **Scheuer**. Ray, thank you very much for coming; we appreciate it. I think there is a consensus up here that supports your position, and we are very grateful for your coming.

Mr. **Kogovsek**. Mr. Chairman, thank you very much.

Mr. **Brown** [acting chairman]. Mr. Blanchard.

Mr. **Blanchard**. Mr. Chairman, I had hoped to be present for the entire testimony of Administrator Byrne, but I am not going to be able to stay here for the rest of the afternoon.

I did want to underscore a concern to NOAA from this subcommittee relating to the Great Lakes. As you know, Mr. Chairman a number of us have been concerned about the Reagan administration's going back on commitments with regard to Great Lakes water quality and research programs directed at maintaining and improving Great Lakes water quality.

I do not have to remind anyone that the Great Lakes are 95 percent of the surface freshwater of the United States—1 out of 10 Americans derives his or her drinking water from the Great Lakes. It is 20 percent of the world's surface freshwater, and in a State like Michigan it is the lifeblood of our agricultural system, and helps generate countless dollars in tourism revenue.

But it is really a precious national resource and one which needs to be properly managed with our important ally and neighbor, the Nation of Canada.

The Great Lakes, while outstanding, have also been among the more abused bodies of water in the world, with intensive industrial, agricultural, and municipal uses, which have left a trail of pollution that we need to monitor, understand, and control for the future. This problem will not go away because we wish it so.

In that spirit, I am most concerned that the fiscal year 1983 NOAA budget would curtail funding for the Great Lakes Environmental Research Laboratory in Ann Arbor, Mich., something we on this subcommittee consider to be extremely important.

It is an item which was funded for fiscal year 1982 at $3.6 million. It has over 60 employees and works closely with the University of Michigan. It is a critical facility that does important research on the lakes, including the persistence and accumulation of toxics.

I would hope that at some point, either this afternoon or in writing, Dr. Byrne, you would give us a rationale as to why in heaven's name you would want to close such a facility; how you would expect the United States to live up to its water-quality agreements with Canada without that facility when most people feel it will be virtually impossible for us to maintain these agreements with Canada without the Ann Arbor Lab; and, additionally, how you justify the planned elimination of the sea grant program, in which universities participate and in doing so, study problems relating to the Great Lakes.

Finally, I hope that you will take a serious look at H.R. 3600, the Great Lakes Protection Act, which we have offered as perhaps the best way to improve the Great Lakes water quality-research-effort. To the extent there is duplication or to the extent we want to get more research for our dollar, H.R. 3600 would encourage this work to be done in a coordinated fashion.

I hope you will reconsider the budget decisions and answer the questions I have posed. I regret I will not be here to hear all of your testimony.

Thank you, Mr. Chairman.

Mr. BROWN. Why do you not come up to the table, Dr. Byrne and Dr. Calio? In the meantime I will recognize our distinguished Ranking Minority Member, who has a ringing testimonial to the value of your agency's work. We are always pleased to hear from him.

Mr. WINN. Thank you, Mr. Chairman.

Dr. Byrne, I just want to commend you and the administration for the proposed reorganization plan of incorporating some of the various agencies and regions by stopping some of the duplication and the overlapping that some people feel has occurred. I think such action is necessary and follows right down the line with trying to get more mileage for the taxpayer's dollar in any field and particularly in your field. I commend you on that.

Obviously, I am talking about the President's FY 83 budget proposal to consolidate Weather Service's (NWS's) conterminous service regions at a Federal savings of $1,200,000.

The NWS service regions consist of geographic areas having a significant degree of commonality in weather, climate, and service requirements. The regional headquarters offices provide a management structure for the supervision and necessary technical and administrative support required for NWS field operations and for the implementation of policies, procedures, and plans. These offices do not provide public services and are not directly involved in the operational preparation or dissemination of warnings and forecasts.

Under this proposal, NWS's four conterminous regions will be consolidated into three managerial areas of responsibility by absorbing the Southern Region, headquartered in Fort Worth, Texas, into the other three regions. Managerial responsibility for the Southern Region, covering an area south of Missouri and extending from New Mexico eastward to Georgia inclusively, would be assumed by the NWS Central Region, headquartered in Kansas City, Missouri, and the Eastern Region, headquartered in Garden City, New York. The Central and Eastern Region headquarters staffs will be augmented to accommodate the additional managerial, administrative, personnel, technical, and engineering support required as a result of their expanded jurisdictional areas.

I just wanted to go on record in support of this consolidation and I look forward to your testimony, Dr. Byrne.

Thank you, Mr. Chairman.

Mr. BROWN. Thank you very much, Mr. Winn.

Now, it is a pleasure to have the distinguished Administrator of the agency with us today. Obviously, you see you have many friends here. With friends like these, you do not need enemies. [Laughter.]

We are very happy to have you. You may proceed with your statement, Dr. Byrne. The full text will appear in the record, without objection.

STATEMENT OF JOHN V. BYRNE, ADMINISTRATOR, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ACCOMPANIED BY ANTHONY J. CALIO, DEPUTY ADMINISTRATOR; AND JAMES SMITH

Mr. **Byrne**. Thank you, Mr. Brown.

Ladies and gentlemen, before I begin my comments, I would like to introduce my colleague to my right, Mr. James Smith, who will handle any specific details that I might need in response to questions on the details of the budget.

I do have a prepared text, which you have. I would like to highlight this to some extent and then proceed to whatever questions you may have.

First let me say that my view of NOAA is that it is primarily a service agency. We conduct scientific research which is in support of that service, and we also have a responsibility for the management of oceanic and atmospheric resources, which is largely handled through regulation.

I think it is clear that at this time we are going through a major change in the way we approach our activities and how we do business. Those of us in NOAA are clearly aware of this change. We are making every concerted effort to evaluate what we have done in the past so that we may continue to serve in the best fashion possible.

We are evaluating what could possibly be done better by the private sector or other agencies. We are attempting to determine what our priorities should be as the leading civil agency for oceanic and atmospheric activities. As we do this, of course, we must develop new methods.

When I came to NOAA, I came with some understanding of what the agency was about, and was impressed with what I saw. I was immediately impressed, and have been over the 7½ months that I have been with NOAA, with the exceptional quality of the people who carry out the services and conduct the research.

There are a great many activities for which NOAA employees are responsible. These include such things as studying and modeling the effects of carbon dioxide on the atmosphere, the nature of acid precipitation, the source and effects of chemicals and other additives put into the marine environment, and the nature and changes that take place with respect to marine populations and organisms in the environment.

NOAA technicians produce and distribute nautical charts and aeronautical charts. We analyze atmospheric conditions and make warnings. We operate ships, satellites, buoys, aircraft, and radar. We are responsible for managing the living marine resources of our portion of the ocean, maintaining the habitats in which those resources multiply, and develop new ocean industries where those opportunities present themselves.

I think it is clear that many of the accomplishments which are made by NOAA scientists and their colleagues from day to day make headlines. However, there are a great many that do not. These are the day-to-day operations. They receive little notice until we consider terminating these services, and then they do acquire some notice. I am impressed that the agency is an exceptional collection of very dedicated and very competent people.

There are a great many accomplishments over the past year that we could cite. In the interest of time, I will not go through all of these. They are listed in the testimony. There are several of them that I think are particularly noteworthy.

These include improved forecasts for hurricanes, tornadoes, and flash floods; and such spectacular findings as the newly made discoveries of polymetallic sulphide minerals, which occur in the spreading centers of the ocean floor and are potential ore deposits, which conceivably could change the entire balance of strategic minerals.

We have investigated acid-rain conditions and discovered that, even in remote areas of the world, there is, on occasion, a high indication of acidity in the rain, indicating either that pollutants in the atmosphere are being transmitted long distances or that, in fact, some of the acid-rain conditions are the result of natural conditions.

We have learned a lot about predicting severe weather events. The isolated summer storm of a decade or two ago is now recognized as part of a much larger feature, a feature that the scientists refer to as a mesoscale convective complex. These complexes can be predicted.

So we are making significant strides in these directions.

In the area of satellites, we have developed new technologies which assist the weather forecaster in making precise determinations of what the weather will be.

As we move into 1983, as we begin to look at the changes that are taking place, we are impressed that one of the major, if not the major, problems facing us right now is that of economic recovery. We are doing everything we can as an agency to trim our budget and, at the same time, to continue to provide the essential services that we must provide to prepare for the future by taking advantage of advances in the state of the art of the science of new technology.

As we look at this, we envision possibly new ways of doing business; of reducing the Federal involvement in areas that the private sector could exploit; in transferring some of the activities from the Federal Government to State and local governments where that seems appropriate; in recovering costs through the use of user fees, thereby reducing the Federal budget; in eliminating lower priority programs if that is necessary; and in generally operating in a more efficient manner, so that we may reduce Federal overhead.

We recognize that oceanic and atmospheric programs are important and will continue to be important to the people and to the Federal Government. They are expensive programs. They are disbursed throughout the Federal Establishment.

Ocean activities, for example, exist in 10 departments and more than 40 agencies throughout the Government. It is clear that, as we attempt to improve our efficiency, we can no longer afford to operate in an independent fashion but must make every effort possible to coordinate our activities at the Federal level.

I might add that I believe it goes beyond that. We must coordinate our activities not only at the Federal level but with the academic community and with private industry as well.

The concern I have is that, as we make these attempts to decrease the Federal expenditures, new programs might be eliminated which perhaps have magnificent futures that are still unknown to us but are vulnerable because they are new. So we need to watch this very carefully.

With respect to 1983, we anticipate that we will continue to provide the fundamental services needed by the people of the United States. We will look for ways in which we can involve the private sector in providing these services. We will continue to provide and continue to do the research, or contract the research with universities and other private agencies, that is essential as a background to the services that we provide. And we will strive for greater efficiency.

This year's budget request is approximately $750 million. With this budget we believe that we can do these things.

If we can turn to specific areas of the budget with respect to weather observation and prediction, we feel that our highest priority is the protection of life and property. Another high priority is that of promoting economic development by assisting individuals, private industry, and Government agencies in using the physical environment.

We feel that there is a need to provide information and technical services, and we will continue to do this, that is, to monitor, to predict, and to warn with respect to weather events.

Looking to the future, one of the major elements that we are planning on is the use of a new generation of radar. We refer to it as NEXRAD. This program is underway. The system definition and design phase of the program are already contracted with private industry.

In working cooperatively with other agencies and with private organizations, we have developed an integrated flood observing and warning system in a 12-county area in the Appalachians. I would stress that this is a cooperative effort among the National Weather Service, the Appalachian Regional Commission, and the States of Kentucky, Virginia, and West Virginia.

In making better use of our satellites, we have a program in which we are introducing a satellite weather information system which will provide receivers in 52 weather service offices that will enable the forecasters in those offices to use very current satellite imagery rather than relying on hard copy, which they rely on at the present time.

The budgetary request to support our weather observations and predictions is about $244 million. We anticipate that a savings of approximately $34 million over last year's budget can be made by substituting more generalized weather information, which will provide the basic data needs for specific users in agriculture and forestry, and that we can centralize some of our forecast services to aviation.

We anticipate that in carrying out our aviation weather program we will be shifting, to a higher degree, to user fees, relying on and using the airport and airway trust fund.

Supporting research for the weather services is budgeted at approximately $22.2 million. Such research is being concentrated on those features that are relatively small in size. We refer to them as mesoscale. They are short term and focus on local area forecasting.

The first priority in this area is to study convective storms, where there is a large amount of overturning of the atmosphere above a relatively small geographical area. These are the storms that traditionally have produced hail, tornados, high winds, heavy rains, and so on.

With respect to the use of satellites in support of our weather services, the satellites will continue to provide much of the fundamental information needed in making adequate predictions.

We have an increase in our satellite budget this year in the amount of $35.5 million for increases in the acquisition of the geostationary satellites; those are the satellites stationed over the Equator which provide much of the imagery seen by the American public on television and in other media.

We anticipate a savings in the satellite program by changing from two polar-orbiting satellites to a single polar-orbiting satellite with replacement launches planned for every 18 months rather than a launch every year at this time.

In the area of charting, mapping, and geodesy, we provide fundamental background for much of the mapping in this country—the land mapping—through our national geodetic system. We do the nautical charts and marine navigation ourselves and map the coastal and sea-floor areas.

In addition, the National Ocean Survey provides real time information on tides, currents, and other ocean variables. We will continue these programs.

We also in that single unit produce aeronautical charts. I will say more about that in a few minutes.

The budget for mapping, charting, and geodetic programs amounts to about $53.5 million.

As far as the aeronautical and nautical charts are concerned, we are anticipating the increased use of user fees. At the present time, we have user fees for these charts, but these cover only the costs of publication and distribution. Our attempt will be, over the next 3-year period, to provide the full cost of the development of those charts from a user fee.

Another area that is of concern and is carried out by the National Weather Service is that which we refer to as the hydrologic service. This particular service provides information that leads to prediction of flash floods, using the latest technology that is available—computer models and so on—to increase the warning time for people living in flash flood areas. We will continue to improve this river- and flood-forecasting system.

In the area of air quality, our focus has been to address the problems involved with understanding changes in the atmosphere that affect its quality, particularly those changes which affect the quality which has a significant impact on human activity.

Monitoring the global concentration of carbon dioxide is a program which has gained great attention. We will continue this activity as well as continuing to measure ozone and to attempt to predict the trajectories of movement of contaminated air masses.

In the area of acid precipitation, we anticipate an increase in the program. We believe this is important. We will continue this program under the aegis of acid rain, but it should be borne in mind that there will also be fundamental atmospheric research which contributes to a knowledge of the acid-rain situation and hopefully will lead us to a solution to that problem.

We anticipate continuing our research in climate, focusing on those aspects of climate which are sensitive and important to human activities. These, of course, include the atmospheric levels of carbon dioxide I recently mentioned as well as the effects of equatorial and subtropical sea-surface temperatures on climate.

I have a feeling that perhaps the clue to better climate prediction lies in these areas, and so activity involving both the oceanographers and the atmospheric scientists is involved.

In terms of how we handle data and so on, we have made some strides with our environmental data and information service in developing a data referral service, recognizing that all of the data that are pertinent do not lie within NOAA. We feel the need to be able to access such data, and so we have put together this referral service, which is improving and will give us a better handle on where such data do exist.

With regard to weather modification, the weather modification program is one which has gained a great deal of attention. As we have gotten more and more involved in it, we have found that our fundamental knowledge in many cases is lacking.

Several years ago a program in hurricane modification was a major effort. Subsequently we have discovered that our understanding of hurricanes was really inadequate to modify them at that time. Therefore, much of the weather modification activity will be carried out under the banner of basic research, in terms of understanding in a better way the physics and chemistry of the atmosphere.

The solar terrestrial program, which previously had included not only a service function but also a research function, will be pruned down and will include primarily the service function. It is our understanding that much of the fundamental research is being carried out by other agencies. Therefore, in our attempt to minimize our activities while insuring that appropriate services are provided, we will attempt to keep that service functioning in at least a partially funded manner.

In terms of marine operations and predictions, the prediction of our activities along the coast—tides, waves, currents, and so on—will be continued. The long-term research objective for marine prediction is to understand and develop techniques for forecasting conditions of the ocean environment so that we may better serve the user communities.

There are a number of areas in this that we could address, involving improved port and harbor conditions, predictions, and so on. I will skip by those for the present.

I would now like to turn to the introduction of foreign substances into the ocean, frequently referred to as marine pollution. We will continue research on the long-term effects of waste disposal, especially the physical dispersion and chemical transformation of ingredients added to the marine environment. This will be funded, in part, through university laboratories but also will, in part, be carried out within NOAA Laboratories. We do anticipate savings in this area as we do more work with existing data, eliminating some of the localized projects which previously have been funded.

I should mention marine resources and research. The exciting news here, of course, is the activity that we have carried out in the discovery of the polymetallic sulphides. I would only mention that as an example of some of the attention that we devote to resource information development at the point that it becomes practical to exploit such mineral deposits or to steer private industry in that direction, it would be our intention to phase down such programs or possibly get out of them completely as we look for other resources to develop.

In carrying out these activities, the oceanographic fleet is an important element of our activity. Fleet operations are expensive. We find the need to coordinate such fleet operations with the rest of the Federal fleet operators, the Navy, the National Science Foundation, and the Coast Guard, and we are involved in doing that. We do anticipate, as other programs are reduced, to reduce our ship operations. The forecast of 1983 is the need for about $52 million. This will result in the layup of two vessels, and it will also result in a reduction of days at sea and possibly the closing of the support facility in Miami, Fla.

The steps that we are taking as we attempt to reduce the budget and get a better handle on the economic situation also include to looking internally to see which ways we can improve the efficiency of the National Oceanic and Atmospheric Administration. In this regard, we have three activities underway at the present time.

The first of these is a reorganization of the agency, which we believe will make it a more efficient agency and will also provide added focus for our activities in certain areas, particularly in the oceans. We are very much in the midst of preparing a 5-year plan for NOAA, with a 10-year outlook. This plan will be reviewed annually. It is our hope that we will have the plan completed before we need to consider the 1984 budget.

And the third major factor that we are looking at is the matter of doing business in different ways, involving the private sector, working in a more coordinated way with other Federal agencies. We have a number of interagency mechanisms, several of which are well known to this committee. The ocean pollution research plan, the national climate program plan, and so on. The operating agencies involved with oceans also have coordinating mechanisms. As one example, the Federal Oceanographic Fleet Coordinating Council this month is attempting to come up with a better means of coordinating scheduling for vessels by actually implementing changes in the scheduling procedures of each of the major agencies.

In conclusion, I would say that I recognize the challenges that lie before us. I frankly am personally very enthusiastic about the opportunities that reside with these challenges, and I think that having friends as you have indicated, we can look forward to working together for better things for the people of this country.

At this point, Mr. Chairman, I would be pleased to respond to any questions you might have.

[The prepared statement of Mr. Byrne follows:]

STATEMENT OF JOHN V. BYRNE
ADMINISTRATOR
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
DEPARTMENT OF COMMERCE
BEFORE THE
SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE, RESEARCH AND ENVIRONMENT
COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

March 3, 1982

Mr. Chairman and Members of the Committee, I am pleased to appear before you to discuss NOAA's science and service activities.

I believe that NOAA's primary mission is service, scientific research to support those services, and management to respond to our statutory, regulatory, and coordination responsibilities, often in that order. NOAA, like all other parts of our society and the Federal Government, is going through a fundamental reassessment. The circumstances today are not ordinary. We must look at the needs of our economy and the impacts of necessary budget reductions. We must evalutate the past to see what we do best, what can be done better by others, and what our priorities as a Federal agency should be. We must develop new methods to handle our responsibilities to the public. In this context, I will discuss some of NOAA's recent accomplishments, policy trends, and how these trends affect FY 83 programs. I will then turn to the opportunities for NOAA to respond to future demands.

I. NOAA Accomplishments

A Tradition of Service

Before coming to NOAA, I recognized its unique nature and most valuable resource -- its people and their accomplishments. The finest scientists, technicians, and managers perform innovative research, apply that research to national needs, supply essential information about our environment, and make recommendations to resolve questions and conflicts concerning the present state and uses of our oceans and atmosphere. For example, NOAA scientists study and model the effects of CO_2 on the atmosphere, the nature of acid precipitation, the source, fate, and effects of pollutants in the marine environment, and the nature and changes of marine populations. They prepare daily weather and longer range climatic forecasts, warn of severe weather, and assess natural and man-made changes to our environment. NOAA technicians produce and distribute nautical and aeronautical charts; collect, process, and disseminate all types of atmospheric and oceanic information; operate ships, satellites, buoys, aircraft, and radars. NOAA managers seek to protect U.S. living marine resources and their habitats, assist the development of new ocean industries, and coordinate local efforts to develop and protect our coasts.

In considering NOAA's total program, many of these "accomplishments" -- that is, the day-to-day tasks which form the core of NOAA work -- receive little notice. Some of these accomplishments are routinely listed in the annual budget submission to Congress --

the number of charts produced, the frequency and extent of weather observations, fishery resource statistics, and the number of user requsts for environmental information and publications. These traditional service accomplishments account for a major portion of NOAA's budget.

Sample of NOAA's Recent Accomplishments

The list of NOAA accomplishments is long, even for a single year. I will mention only a few highlights of interest to the Subcommittee.

Weather Services

o A continuing accomplishment of NOAA is our constantly improving capability to provide forecasts for hurricanes and tornadoes. During this past year, NOAA provided forecasts for 10 hurricanes, including periods in which as many as three storms were active simultaneously. Important improvements have been made in the development and use of models for forecasting storm surge, the most destructive result of hurricanes along the Atlantic and Gulf coasts. We have seen a significant improvement in the accuracy of forecasting areas in which tornadoes occurred. This was a significant factor in the reduced number of deaths due to tornadoes during the past year. NOAA has also increased its ability to forecast and warn the public of major river basin flooding and flash floods.

- In the area of basic and adaptive weather services, NOAA expanded marine and ocean prediction service; began automation of coastal observations; expanded the NOAA Weather Wire Service and Weather Radio System; and improved the Fire Weather, Agriculture, and Aviation Weather Service programs.

- NOAA has also introduced a new way of accomplishing the central weather service functions with the development and demonstration of the Automation of Field Operations and Services (AFOS) system. This system applies modern computer-based technology and automatic techniques to day-to-day weather service operations.

- NOAA has moved forward in the management of the Next Generation Weather Radar (NEXRAD) program. The Joint Systems Program Office is now staffed by NOAA, DOD, and FAA, and the system acquisition procedure is progressing on schedule.

Mapping and Charting

- The National Ocean Survey made the first discovery in the world of large polymetallic sulphide ore deposits on the seafloor using the NOAA SEABEAM system and the submersible

ALVIN. This discovery of a 25 million ton mass on Pacific Ocean floor has revolutionized the concept of marine minerals formation and mining. These ores, containing a number of strategic metals, may provide a better incentive for ocean mining than manganese modules.

- o We have recently developed a system to improve the productivity and safety of marine transportation in major port areas by disseminating tide level data to ship operators in real-time. In the Port of New York, our National Ocean Survey recently completed a basic charting survey which revealed discrepancies in existing harbor charts for the area. Also, new high-accuracy hydrographic data provided by the survey could reduce the estimated cost of dredging for 60-foot draft vessels by millions of dollars.

Research and Development

- o Acid rain has been documented in eastern North America and northern Europe. Its coincidence with man-made sources of sulfur oxides and nitrogen oxides points the finger at utilities, transportation, and industry as the culprits of acid rain. However, NOAA has measured acidity in rains remote from man-made sources in locations such as the NOAA Mauna Loa Observatory on Hawaii and Amsterdam Island in the southern Indian Ocean. In these remote locations, we find the rain acidity to be surprisingly high, at time as high as in eastern North America. This suggests that either the acidic materials can be transported great distances or, that there are significant natural sources of pre-acidic materials. Either of the two explanations for the remote acidic rains has a significant bearing on assessment of ameliorative actions to avoid the adverse effects of acid rain.

o The relatively recent discovery of mesoscale convective complexes (MCCs) points the way toward improved prediction of severe weather. NOAA researchers have shown that summer thunderstorms, instead of acting in isolation as previously thought, act in concert, in large complexes covering areas the size of an entire state or more. Typically some 50-100 of these complexes, which contribute approximately 60 percent of the warm season rainfall in the U.S. but frequently lead to tornadoes, flash floods, or hail, move eastward across the United States. Studies by NOAA and university scientists indicate that, in principle, MCCs are predictable.

o Recent scientific results of NOAA's Equatorial Pacific Ocean Climate Studies (EPOCS) and The Global Weather Experiment (FGGE) indicate that further investigation of a wider geographic area and longer time domain can lead to predictions, several seasons in advance, of seasonal climate change over portions of the United States and elsewhere.

- NOAA's Environmental Data and Information Service developed a national model describing the impact of temperature anomalies on electric power demand. As a result, EDIS now issues monthly and seasonal projections of electric energy demand for multistate regions of the country during both the heating and cooling seasons. These estimates go to the Department of Energy and to other Federal agencies responsible for energy use and planning, to State energy agencies, and to industry.

Satellites

- NOAA's Satellite Service has demonstrated that the new atmospheric sounder instrument carried on the GOES geostationary operational environmental satellites can obtain temperature and humidity soundings on command to aid both small and large scale weather forecasts. This instrument has already become operational in support of forecasts for the west coast of the U.S. for improving the knowledge of the rainfall which is likely to be produced by storm systems moving in from the Pacific Ocean. This will provide warnings and forecasts of severe thunderstorms and hurricanes in the Western Hemisphere.
- We have begun development of five products which will be used by the Department of Agriculture for improving our

knowledge of the earth's food crops. The AGRISTARS project -- Agricultural Remote Inventory Surveys through Aerospace Remote Sensing -- will use the satellite products to determine information needed for agriculture production.

II. NOAA's FY 83 Program for Science Services

Policy Objectives of the Administration

The Economic Recovery Program is the highest priority of this Administration, and departments and agencies are realigning their goals and missions so as to best support and contribute to the success of that program. It is important that the economy be improved. Each of us must do whatever we can to achieve that goal. At the same time we must continue to provide essential services today and we must prepare for the future.

This Administration has provided new guidelines to follow as we reevaluate our program activities. These include: (1) reducing Federal involvement in private sector functions; (2) transferring appropriate activities to State and local governments; (3) recovering costs that can be clearly allocated to users; (4) eliminating lower priority programs; and (5) reducing Federal overhead and personnel costs. All of us in Federal government, State and local governments, industry, and academia will have to work together to insure that appropriate activities remain with the Federal agencies and that appropriate activities are coordinated outside the Federal Government.

In relation to oceanic and atmospheric programs, there will never be enough resources to do all of the important and interesting missions or to pursue all of the promising research and development projects, but these programs have grown constantly during the past two decades. Oceanic and atmospheric programs remain on the national agenda. In order to provide growth for the higher priority programs, some other programs may have to be reduced or eliminated. Those of us involved in oceanic and atmospheric activities -- some 10 departments and more than 40 agencies and subagencies on the ocwean side alone -- cannot continue to act independently. We must come together to answer fundamental questions about what we are and where we are to be in 1985 and 1990 and to establish overall goals and objectives for the oceans and atmosphere.

With the limited resources available to address ocean and atmosphere problems, I am particularly concerned about the vulnerability of "new programs" -- and I believe many science and technology activities fall in this category. New research programs are often initially difficult to justify because the pay-off, which is often uncertain, lies some time in the future. As we evaluate priorities, we must maintain a balance that will allow us the flexibility to nurture important new projects.

NOAA's Goals for FY 83

Earlier, I stated that NOAA's basic roles are: service; scientific research both applied and fundamental in support of NOAA services; and management and regulation. We have been working with the Secretary of Commerce to develop a set of NOAA long-term goals and objectives that support the major goals of the Department of Commerce which are: (1) to increase America's competitiveness in the world economy; (2) to stimulate economic growth and recovery; (3) to manage effectively the oceanic and atmospheric resources of the U.S.; and (4) to improve service delivery and internal management. NOAA activities are directed toward the achievement of these goals.

Program Highlights

I will now review NOAA's FY 83 science and service programs of interest to the Subcommittee.

Weather Observation and Prediction

NOAA's basic weather objectives are (1) protect life and property from environmental hazards by providing all essential forecasts, warnings, and advisories to the general public and both public and commercial user groups; (2) promote economic development by assisting individuals, private industry, and government agencies in using the physical environment to produce goods and services more effectively while minimizing losses attributable to environmental causes; and (3) provide the information and technical bases for the assessment of socio-economic impacts on the quality and use of the physical environment.

NOAA's Weather Observation and Prediction Programs in FY 83 will provide basic weather services to the nation and continue research to improve our abilities to monitor, predict, and warn about weather phenomena. A continuing accomplishment of NOAA is our ability to steadily improve the forecast and warning support for hurricanes and tornadoes, and major river basin flooding and flash floods. We are confident that these improvements in forecasting accuracy will continue in both the near and longer term.

As I indicated earlier NOAA has moved forward in the management of the Next Generation Weather Radar (NEXRAD) Program. The system definition and design phase of the program is underway with private industry. This new radar using doppler technology will significantly improve our warning lead time for severe weather, hurricanes, and flash floods.

In this fiscal year, the National Weather Service will continue implementation of the Integrated Flood Observing and Warning Service (IFLOWS) in a 12-county area along the Appalachian Mountains. This service is a cooperative effort between the NWS, the Appalachian Regional Commission, and the States of Kentucky, Virginia, and West Virginia and it will provide timely guidance and advice to both staff and local authorities responsible for emergency services in these areas.

Weather services to the public will be further enhanced by the use of a new Satellite Weather Information System which will improve the quality and timeliness of forecasts and warnings.

NOAA completed another successful demonstration of the Automation of Field Operations and Services (AFOS) system. This demonstration, like the earlier tests showed the system surpassing pre-established pass/fail criteria by very significant margins. AFOS will be operational across the country by the end of this year.

In FY 83, NOAA's budgetary request to support our weather observations and prediction services is about $244.0 million. We propose to achieve savings of $34 million by substituting more generalized weather information which will meet the basic data needs of specific users in agriculture and forestry, and centralize some forecast services to aviation. In addition, funding for the Aviation Weather Program will be shifted to user fees. The cost of providing dedicated aviation weather services would be recovered through reimbursement from the Airport and Airway Trust Fund. Additional savings will be achieved by increasing administrative efficiency. The basic forecast and warning needs of the nation can be maintained while still accomplishing these significant sayings.

With respect to supporting research for weather services, NOAA proposes $22.2 million for FY 83. We will concentrate our studies on mesocale, short-term, and local area forecasting research and development to conduct a focused program with available resources. The first priority in this area has been identified as convective weather systems because of hail, tornadoes, high winds, heavy rains, hurricanes, and flash floods which account for a very large percentage of all weather related losses -- both economically and in terms of human lives.

Environmental Satellites

The main purpose of the NOAA environmental satellite program is to aid in the prediction and analysis of severe storms and other natural disasters which affect the United States. Satellite data play an important role not only in protecting life and property, but also in promoting commerce and navigation.

The budget for NOAA's environmental satellite services maintains these services at levels which we expect will accomplish our basic program objectives -- to monitor severe storms and other environmental conditions affecting the United States -- while reducing the Federal expenditures where possible. The total FY 1983 budget request for the National Earth Satellite Service (NESS) is $151.498 million. Increases are provided for systems changes for compatibility with the NASA communications network and procurement and launch services for the ongoing satellite program. This amount also includes $14.955 million for Landsat operations, but I will not be discussing that. This buddget reflects a continuation of projected funding levels for the geostationary satellite program, a decrease in the polar orbiting satellite program, and a request for Landsat funding that will be offset by user fees.

The FY 1983 budget request maintains the two-satellite configuration for geostationary satellites (GOES) which is critical to provide repetitive viewing of the development and movement of destructive weather systems over much of the Western Hemisphere. Although the budget identifies as an increase $35.5 million from the FY 1982 budget, this amount actually represents a continuation of the procurement for GOES satellites already underway, and is therefore not an enhancement.

NOAA's polar-orbiting satellite system, also called the NOAA or TIROS-N series, collects global observations in support of numerical weather analysis and prediction, flood forecasting, water resource management, fishing, shipping and ocean monitoring services, crop production forecasting, and monitoring solar activity. The 1983 budget request of $25.6 million for polar spacecraft, launching and ground systems will have the effet of converting the current two-polar system to a one-polar orbiting satellite system with replacement launches planned on 18-month intervals. We think that nearly $196 million in Federal expenditures can be saved through FY 1987 because of deferral of additional spacecraft procurements, or a total of $271 million over the life of the revised polar orbiter spacecraft launch plan.

At the same time NOAA continues to provide products from outer space that improve the quality of our life on earth, we are also looking for ways to economize. We are exploring how to produce products with less money. For example, we have recently signed a cooperative agreement with the Navy and Air Force to share processing of polar-orbiting satellite data from civil and military satellites. As part of a Cabinet Council on Commerce and Trade review of the issues of commercialization of civil land and weather satellites, we are also examining which parts of our satellite services can be contracted out to the private sector. Some of our facilities are operated by contractor personnel now.

Mapping, Charting and Geodesy

NOAA's National Ocean Survey conducts programs which provide maps, charts and information that serve merchant shipping, aviation, and all users active in coastal and offshore areas. In addition, geodetic services assist government operations involving space and defense as well as land parcel management. NOS programs include: (1) a national geodetic reference system which is the basis for determining latitude, longitude, and elevation on the solid earth, in the oceans and in space; (2) nautical charts and marine navigation data for 2.5 million square miles of ocean area around the U.S.; (3) coastal and seafloor maps; (4) historical, predictive and real-time data for tide, currents, circulation, waves, and other ocean variables; and (5) aeronautical charts for U.S. national airspace systems.

For FY 83, we are requesting $53.5 million for mapping, charting and geodetic programs of the National Ocean Survey. This level of support will maintain the priority services provided by NOS in all of its areas of responsibility. Budget savings are planned through such measures as deferring lower priority activities and improving service productivity through automation of data acquisition and product preparation activities.

To offset some of the appropriated funds for these programs, we are proposing, through draft legislation, increased fees for aeronautical and nautical charts. In FY 83, we would increase fees to recover about 35% of the gap between present fees and full cost recovery fees which is our goal in FY 85. We believe that it is entirely appropriate that users of charts should pay the costs of chart production rather than ask the general taxpayers, most of whom will never use a chart, to pay those costs.

Hydrologic Services

The purpose of NOAA's hydrologic services is to minimize the loss of life and mitigate property damage from floods through an effective flood warning program for the general public and to support Federal, regional, and state water management activities. This includes a nationwide system to provide flash flood watches and warnings based on constant monitoring of river weather conditions using radar, satellite, and automated data collection networks which serve to alert communities of potential flood dangers.

In FY 83 a new version of the National Weather Service River Forecasting System will be completed and ready for field implementation. Included in this system will be a data management package with a new Standard Hydrologic Exchange Format (SHEF) which will be used to exchange data collected from satellites, computerized data collection systems, cooperative observers and from other agencies. In conjunction with the development of NEXRAD (Next Generation Weather Radar) and in support of our river and flood forecast responsibilities, we will complete expansion of an interim test network of digital radar processing equipment in the Midwest, primarily the Arkansas River Basin and Appalachia. With the completion of this network, we will begin operation of a pilot rainfall analysis program.

During FY 83, NOAA will continue improvement of its river and flood forecasting and warning services with no proposed increase in support. The base program for this activity is $16.2 million. To provide these services the Weather Service field structure is supplemented by 13 River Forecast Centers.

Our priorities in FY 83 will continue to be with development of the forecast system and improved data collection and management. Potential benefits from river and flood forecasting have been estimated to be approximately $100 million.

Air Quality

The National Weather Service routionely provides advisories of large scale atmospheric stagnation to state and local air pollution control agencies to alert them to potential episodes of dangerous pollution. This service is an integral part of the weather forecast system.

NOAA's research and development on air quality will continue to address the problem of understanding and predicting the influence of human activity on the quality of the atmosphere. Activities in this area include monitoring the global concentration of carbon dioxide and ozone and predicting the trajectories of contaminated air masses, including radioactive debris. In addition, studies are being conducted on the physical processes involved in the transport, diffusion, transformation and deposition of air pollutants, and in particular, acidic chemicals which cause acid precipitation.

NOAA proposes $8.0 million for this research program in FY 83. This request includes an enhancement of $300,000 to fund additional acid precipitation research in support of NOAA's responsibilities set forth in the National Acid Precipitation Program (Title VII of the Energy Security Act of 1980).

Climate

The basic objectives of the NOAA Climate Program are to conduct climate research and perform climate data archiving and analysis services in support of NOAA's overall responsibilities for the National Climate Program. In FY 83, NOAA proposes to continue climate research at the level of $18 million. Studies will focus on the sensitivity of climate to human activities, especially those activities which affect atmospheric levels of carbon dioxide and ozone; the effects of equatorial and subtropical sea surface temperatures on climate; the development of models of the physical climate system; and determination of the theoretical and practical limits of atmospheric predictability.

During FY 83, the Environmental Data and Information Service will develop and implement computerized quality control systems and data base management techniques to provide rapid access to key climatic data sets. In addition, selected oceanographic data will be added to the existing climate data base, and a comprehensive National Environmental Data Referral Service (NEDRES) catalog will be developed. The long-term objective of this program is to improve the quality and accessibility of existing climatic data so as to meet the first principal thrust of the National Climate Program to improve the generation and dissemination of climate information. With planned improvements in data management, the FY 83 funds proposed for this program are $565,000, a savings of nearly 50% over the current level.

NOAA proposes that the National Climate Program Office be supported at the level of $1.1 million to maintain that important activity.

Weather Modification

NOAA's weather modification program is primarily devoted to long-term research to improve understanding of atmospheric processes that would determine the effectiveness of any technology to modify weather. NOAA will continue cloud and mesoscale atmospheric studies needed to improve forecasting and will monitor weather modification research and operational activities of other Federal and state organizations. NOAA will also maintain the weather modification reporting program established by P.L. 92-205 and represent the United States in weather modification programs of the World Meteorological Organization. Because of the need to support higher priority programs, NOAA proposes to reduce weather modification research by $4.1 million in FY 83.

Solar-Terrestrial Research and Services

NOAA's Solar-Terrestrial program conducts research relating to solar activity and its relationship to the earth and the atmosphere. NOAA also provides services such as forecasts, alerts, and warnings about solar disturbances which can affect communications, electrical power systems, and the safety of air navigation. NOAA will continue to archive ionospheric magnetic and radar data collected by NOAA and other agencies which can be delivered to users directly by teletype computer coupling. These users include Federal agencies, industry universities, and foreign governments. NOAA will provide priority forecast and warning services for solar distubances, with cost savings achievable through reduction of lower priority activities and less solar-terrestrial research supported directly by NOAA. NOAA proposes $2.0 million for the Solar-Terrestrial Program in FY 83.

Marine Observations and Predictions

NOAA will continue to provide marine observation and prediction services in support of the nation's maritime activities along the coast, offshore, and on the high seas. These marine weather and oceanographic services to coastal residents, recreational boaters, fishermen, marine transport, and our offshore industries contribute to safety and productivity. In FY 83, NOAA's budgetary request to support marine observations and prediction services is $13.6 million. This request reflects a savings of $3 million which will be achieved through management improvements and deferral of lesser priority activities.

NOAA's long-term research objective for marine prediction is to understand and develop techniques for forecasting the conditions of the ocean environment to serve various coastal and offshore users. Research to support marine observations and predictions is an area of increasing importance to NOAA. An important opportunity for research in this area is the application of satellite remote sensing information to forecast models. The FY 83 budget request for all research programs in this activity is $3.5 million.

Marine Pollution Assessment

The fundamental purpose of NOAA's marine pollution assessment program is to provide information to foster balanced management of the marine environment. To do this we have established the more specific goals of: (1) providing scientific information to guide National policy decisions on marine pollution issues, (2) planning and coordinating marine pollution research, and in synthesizing and disseminating the results of this research, (3) providing evaluations of the impacts of development on renewable and non-renewable marine resources, and (4) supporting efforts to prevent or mitigate the effects of accidental release of oil and hazardous materials to the marine enviornment.

In FY 83 NOAA will focus its marine pollution assessment program on the areas of greatest national need. Thus, we will emphasize research on the long-term effects of waste disposal, especially the physical dispersion and chemical transformation of the pollutants in the marine environment and the ecological consequences of present and proposed methods of disposal. This program is conducted in roughly equal parts by NOAA laboratories and by funding extramural studies at universities and in private industry. Besides our research programs, we will also continue to provide scientific support to the Coast Guard in developing control and mitigation measures at major spills of oil and hazardous materials. NOAA requests support for marine pollution assessment research at the level of $10.8 million in FY 83. This level reflects substantial savings through reductions in regional or localized studies which can be funded by state and local governments.

NOAA proposes that the National Marine Pollution Program Office be supported at the level of $645,000 in FY 83 to carry out the mandate of the National Marine Pollution Planning Acts. In addition, the NOAA Environmental Data and Information Service will continue development of the Ocean Pollution Data and Information Network in support of the National Program with funds of $565,000.

Marine Resources Research and Development

NOAA proposes to redirect the marine resources research and development programs of interest to this subcommittee. During FY 83, NOAA will support priority research relating to the occurrence of recently discovered deposits of polymetallic sulfide minerals on the seafloor. Research will focus on analysis of the seafloor spreading centers and the processes that lead to the formation of the sulfide deposits. NOAA proposes $800 thousand for polymetallic sulfide research in FY 83. Substantial budgetary savings are planned through reductions in marine resources research which can be supported by states and the private sector.

Oceanographic Fleet

The NOAA Fleet's objective is to provide ships and associated personnel, instrumentaion, and equipment to support NOAA's marine programs and to ensure operational readiness of the fleet by operating ship bases in Seattle, Washington; Norfolk, Virginia; and Miami, Florida. The NOAA fleet is projected to consist of 20 research vessels to support data acquisition, survey, observation, and sampling for programs of three major NOAA components; the Office of Research and Development, the National Ocean Survey, and the National Marine Fisheries Service.

The FY 83 request for NOAA ship support service is $52 million. This reflects a savings of $6 million associated with layup of two vessels, reduction of 768 days at sea, the closing of a support facility, and reduction in the level of ship rehabilitation.

III. Opportunities for the Future

I am confident that NOAA can maintain a strong and effective program of service to the Nation as the Federal Government adjusts to the fiscal austerity necessary to achieve the President's Program of Economic Recovery. Maintenance of NOAA's excellent record of service will require unusual attention to management efficiency and the setting of priorities. Accordingly, I have proposed several major improvements to NOAA management.

Reorganization of NOAA [illegible]

After careful assessment and consultation with the Secretary of Commerce, I have decided to propose organizational changes that will allow NOAA to maintain or improve services, reflect budget priorities, improve internal and external communications, and reduce administrative overhead.

The proposed changes to the NOAA organization are primarily management restructuring of technical functions designed (1) to facilitate planning and monitoring of NOAA-wide activities; (2) to provide the mechanism for rapid decison-making; and (3) to increase the responsiveness of NOAA's research efforts to the improvement of products and services and the effectiveness of regulatory activities. I also expect important program improvements.

Long-Range NOAA Plan

In light of the Administration's fiscal policy and the opportunities to improve NOAA's services by more careful attention to agency-wide priorities, NOAA is now preparing a long-range plan. The NOAA Plan will provide direction to improvement of NOAA's programs and management during the remainder of the decade. I expect that the planning process itself, including periodic updates and adjustments will be more beneficial than the production of a single "Five Year Plan". The NOAA long-range planning process will ensure that NOAA fulfills its basic missions and takes maximum advantage of opportunities for program improvement in priority areas. As in the case of the proposed reorganization, I look forward to consultations with members of the Subcommittee concerning NOAA's long-range planning.

New Ways of Doing Business

The setting of goals and objectives in a long-range plan, and reorganization of NOAA are two necessary steps toward improving the functioning of NOAA. A third step, in view of having fewer resources with which to operate, is finding new ways of doing business. Although necessitated by budget reductions, I consider this third step an opportunity to implement our priorities and strategies for the future.

We are actively investigating a number of new ways of doing business, some of which are directed by Administration guidelines and several that are not dictated but seem appropriate. I will briefly comment on three of these mechanisms: (1) transferring appropriate activities to the state or private sector; (2) user fees; and (3) cooperative interagency programs.

Transfer to the Private Sector

Perhaps the best example of transferring appropriate activities to the private sector is the area of satellite operations. The appropriateness of transferring some satellite operations to the private sector -- specifically Landsat operations -- does not seem to be in question. Our Fiscal Years 1980 and 1981 budgets included funds for planning NOAA's management of Landsat and preparing for eventual transfer to the private sector. An associated question -- a question now being considered by a Cabinet council -- is whether the private sector should also operate civil weather satellites. The outcome of the Cabinet Council's deliberations could have a significant effect on the way NOAA "does business" in the satellite arena.

Another program transfer is that of coastal zone management responsibilities to the coastal states. We are proceeding with plans for the phase-out of Federal financial assistance and full institutionalization of coastal zone management at the state level. NOAA will continue to provide comprehensive coastal information and assessment services, as well as protection of marine and estuarine sanctuaries.

User Fees

A second management mechanism assists in providing funds for some programs through user fees. We are systemtically evaluating NOAA programs to determine which ones can be financed entirely or in part by user fee revenues in lieu of general tax revenues.

Those programs whose users are states, municipalities, or identifiable special beneficiaries, and those programs which have as their primary mission to provide convenience or commercial value are the top candidates for user fees. These programs are then evaluated to determine how user fees will affect program constituents and international relations, and to consider problems in implementing the user fees, such as fee administration costs, the need for a revolving or trust fund, the need for copyright protection, and the need for other legislative authority.

Programs that are not considered for user fees include those programs whose users are exclusively other Federal agencies, the general public, or unidentifiable beneficiaries. Those programs whose missions are to provide protection of life and property or to provide Congressional mandated income transfer may be considered but have lower potential for user fees.

Of course, user fees are not new to NOAA. FY 80 user fee receipts amounted to $41 million dollars in 21 programs. However, our first round of user fee evaluations has identified nearly two dozen programs in which there is a potential for new or increased user fees that could produce perhaps $100 million in revenues by FY 85.

Interagency Mechanisms

The third mechanism -- cooperative interagency programs -- may not be a "new way of doing business", but it is a mechanism that certainly requires serious reevaluation. Legislated interagency planning activities, such as the National Climate Program and

National Marine Pollution Program, have worked well, but they are not enough. We must expand the cooperative effort beyond the planning activities and into program implementation. In the services area, for example, I am concerned about the future of the Federal oceanographic fleet. Ships are an expensive capital asset. The three major fleet users and supporters -- NOAA, Navy, and NSF -- have all experienced budget reductions which result in curtailment of ship operating time, or ship rehabilitation. As Chairman of the interagency Committee on Atmosphere and Oceans (CAO) -- an activity under the direction of OSTP -- I convened a special meeting of the Federal Oceanographic Fleet Coordinating Council to consider the impacts of budget reductions and develop options for meeting the ship support needs of all Federal agencies. We expect to have a report on this issue soon.

In the research areas, interagency cooperation produced the Federal Plan for Ocean Pollution Research, Development, and Monitoring; the National Climate Program's Five-Year Plan; and, more recently, the National Acid Precipitation Assessment Plan. Now, we need to find a way to put these plans into action. Additionally, we should find a way -- through interagency cooperation -- to exploit the new discoveries of polymetallic sulfides in the Pacific.

Finally, by taking a harder look at existing cooperative programs, we may find some multiagency activities that could be done more efficiently by a single agency. I am exploring this subject with my counterparts in other agencies.

I hope this hearing is the start of a continuing dialogue and that we can work together to implement policies that lead to successful programs. This concludes my presentation, and I will be pleased to respond to questions.

Mr. BROWN. Thank you very much, Dr. Byrne. That is a very comprehensive statement which we are very happy to have.

Mr. Sensenbrenner, would you like to start off the questioning?

Mr. SENSENBRENNER. Certainly, Mr. Chairman.

Dr. Byrne, I have had a chance to review your testimony. As you are undoubtedly aware, there have been a parade of witnesses that have come before this subcommittee that criticized various parts of the NOAA budgets, specifically in relation to the budget for the U.S. Weather Service. I am more than somewhat disappointed that your testimony has not responded to most of those allegations. I think they have a great deal of merit to them.

We have heard about the shutting down of some weather forecasting stations. We heard earlier today about the discontinuation of the agricultural weather service's forecasts. I can just look at what has happened in my own home State with the proposed shutdown of the La Crosse station and the downgrading of the Milwaukee station by transferring out the aeronautical forecast from that. Frankly, I do not think we have had adequate explanations to give to our constituents, especially those of us who represent areas that have been affected by these changes and who have supported the Reagan budget proposals, including a cutback in the total authorization for the NOAA operations.

Frankly speaking, I am getting more and more uncomfortable with this nonresponsive attitude that seems to be going on. Employee morale has suffered rather substantially, and I am serving notice on you that unless there are some better and more adequate explanations in response to some of these things, I am not going to be supporting what the Administration is coming up with in this area.

I yield back the balance of my time, Mr. Chairman.

Mr. BROWN. Thank you, Mr. Sensenbrenner.

Mrs. Schneider.

Mrs. SCHNEIDER. Dr. Byrne, I would like to ask you to give us your attitude toward the NACOA report, insofar as marine pollution is concerned. Do you find it to be a relatively sound document?

Dr. BYRNE. I should say that I usually find what NACOA does to be sound. It does reflect the opinions of the members of the committee, of course. If you are referring to the aspect of the pollution report, the dumping report, that would indicate the change in attitude over the years from one of not placing materials in the oceans to one of considering the total environment with respect to waste disposal, my personal feeling would be that one of the major resources the ocean provides is as a receptacle. But as we deal with any other resource, we must deal with it in a wise fashion which, hopefully, will be based on knowledge. The role that we see for ourselves is one of research in this area. I think that in our reorganization of the agency, we will be stressing the use of the oceans as a respository for certain types of substances under certain types of conditions. I must say that I would concur with the NACOA report in this position.

Mrs. SCHNEIDER. I am concerned that if the oceans are used as an integral, overall part of a more grandiose waste disposal program, that the proposed ocean dumping research that would be necessary to help make decisions in that area is adequate. I think it is quite evident that we do need additional ocean-dumping research. How do we reconcile this situation with the proposed cuts in the budget?

Dr. BYRNE. I think the thing that has happened is that we have identified in the past a separate part of our budget as ocean dumping. The fact of the matter is that there are a number of areas and a number of parts of the NOAA budget which contribute to our knowledge of what happens when you introduce something into the marine environment.

We have a certain amount that is being investigated in a category that we refer to as habitat investigations. This is a nonregional-type activity. Studies of microconstituents take place, and there is a total there of about $884,000. There is a program involving long-range effects of substances added to the marine environment; another $4.8 million there. Under Public Law 95-273, we have activities that amount to about $3 million in disseminating information and so on. I guess the additional funds that we have involve hazardous materials response, some activities involving deep sea bed mining that get into environmental evaluation and so on. The total 1983 budget for ocean disposal work, not necessarily under the rubric of ocean dumping alone is about $12.9 million.

Mrs. SCHNEIDER. And you feel that is adequate to do the job?

Dr. BYRNE. I would say yes, under the present personnel limitations that we have, and under our present operating fashion. We can learn quite a bit with this level of activity. The thing that I think we need to do, and this is why we are addressing the reorganization and the plan, is to begin to bring some of these activities together within the agency so that we get the most mileage for the dollars we spend on these activities.

Mrs. SCHNEIDER. Coming from a State that is geographically small and recognizing that over the past 10 years the State of Rhode Island has gradually been noticing that we are running out of places to put our own waste, there is great concern about dumping in the ocean. It seems to me that, as part of an overall plan, it would receive a great deal of public support. I think that there would be public enthusiams for investment in that particular area.

Let me also ask you about the budget insofar as it relates to the academic community. You had mentioned in your testimony that you will work to integrate your research and efforts with the academic community. I am concerned that the proposed budget would reduce support to universities for R. & D. from about $28,250,000 to $7 million in fiscal 1983. That seems like quite a substantial cut, and I am wondering if this represents a reversal of previous NOAA policy for increasing university-sponsored research as opposed to in-house research?

Dr. BYRNE. The numbers that I have, Mrs. Schneider, do not compare exactly with yours, but the orders of magnitude are about the same.

Let me speak generally first. One of the activities that we are attempting to do, again as part of this reorganization, is to bring together all of the support for university research under one umbrella, if you will. At the present time, the sea grant program has received much attention, and I think justifiably. I think it is not as well known that there are a great many other activities within NOAA that support university research.

The thing that we see when we look at the research activities within NOAA is three components. At the service level, we anticipate having research units working with the people who provide services. The person in the weather service office who produces an hourly forecast simply does not have time to improve the methodology and the techniques he uses, but a researcher sitting next to him could. So we will increase that activity. We will continue to maintain the environmental research laboratories, which do much of the long-term and fundamental research that NOAA does.

The other thing, however, that we really want to expand and pull together is the whole matter of university research. My bias is that one of the best places for fundamental research is in universities. We would continue to support fundamental research in those areas that are of particular concern to NOAA, namely the oceans and atmospheres, so that I think you will see an increase over the years in the kinds of research support that we do provide to the universities.

I might say, we intend to emphasize university research for two reasons. I have focused on the research element. I should also indicate that we believe that it is essential to maintain close ties with the universities because the bright young people coming out, the bright young scientists, we would like to see join NOAA. One of the best ways to do this is to help them through school, through research contracts with the universities.

Mrs. SCHNEIDER. May I share some information with you? We have had testimony before this committee over the great concern that has arisen as a result of the lack of students graduating from science and research and engineering disciplines. Interestingly enough, last evening I was meeting with a group of businessmen. Rather than their discussing tax credits or the economy, they were focusing in the area of education and incentives for trained scientists. I think there is a growing enthusiasm in this area. Particularly when we look at United States productivity on an international basis, and the resources that we have at our disposal, and of course the resource that you are most involved in, the oceans.

It seems to me that this administration needs to focus on the utilization of the academic community and provide some kind of incentives or knowledge to students that this is a priority area for innovation for us. I think you will find the support there.

Mr. SCHEUER. Thank you, Mrs. Schneider.

Congressman Brown.

Mr. BROWN. Dr. Byrne, you have in your statement reported on a number of initiatives which I think are wholly commendable and which I think the committee would want to support you on. I specifically refer to your program to develop a more effective long-term planning operation and clarify the goals that you are trying to achieve; the shifting of cost to users, if possible, with a set of user's fees; improving coordination with some of the other agencies where it might result in some savings; and even transferring functions to the private sector where they can be picked up by the private sector.

The problem that I see is that you have been forced to make some cuts where it is not clear that the service would be picked up and continued in some effective way. I am going to ask you to comment on these. Several of them have been referred to by other members. For example, the specialized weather services, and the ag weather facilities, including the fruit frost. The fire weather services is another example. Do you anticipate or have you studied this situation sufficiently to know whether these will be picked up in some reasonable way, and you can expect a continued high level of service, or is this a situation where you are kind of throwing somebody into the ocean and expecting them to learn how to swim by necessity? What kind of underlying analysis went into these cuts?

Dr. BYRNE. Let me start out by saying that we anticipate the weather service will continue to provide the basic information that the private sector would use to provide specific service to the user community.

It is clear to me that in doing this we need to work very carefully and closely with the private sector. If we took as one example the fruit frost warning, where we could very easily step back from it and not do anything, I think this would really be a dereliction of duty. I think it is our responsibility as we do these things to educate the private sector, in every possible way, to make the best use of the fundamental information we provide and to assist them in establishing relationships with industry.

One way to do this is to set up a series of workshops, demonstrations, seminars, and so on, possibly on a continuing basis. I think that in some of the areas that involve agricultural weather and things that are related to it, there is an opportunity for two major elements of the Federal Government to work together, namely the Department of Commerce and the Department of Agriculture, with agriculture making heavy use of the extension service in this regard.

Although I could not present you at this time with a well laid out plan, pert chart, and so on, it is in our thinking that as we move ahead in this direction more than simply stepping back from the budget will be required.

Mr. BROWN. I am sure you know that we had testimony from both the Florida Citrus Growers and, I think, some communication from California indicating their feeling that having already taken a major cut in the previous year that this was going to be disastrous. Many of the Members of Congress who testified expressed chagrin at this. They would feel much more comfortable if there was some indication that this process which you have described, which is quite reasonable, had taken place in advance of the cuts rather than after the cuts. If it seemed that the service would continue, I am sure there would be very little objection to a reduction of NOAA's involvement in the program. Would you consider that a feasible view?

Dr. BYRNE. I think that is a reasonable position. I would take the position that we will, between now and the 1st of October, be implementing some of these activities in anticipation of the 1983 budget.

Mr. BROWN. Then you would not object if we just made the cuts conditional upon your implementing an alternative plan, would you?

Dr. BYRNE. We will make every effort to make an alternative plan implementable [plan not available until October 1982].

Mr. BROWN. Some of the cuts involve programs that this committee has been interested in for a number of years. We have an inertia about supporting things like that. I specifically mentioned the weather modification research. It looks like you are cutting about $4 million out of that program, which appears to be cutting it right down to the bone. Would you give us your version of what the relative levels of program cuts are here?

Dr. BYRNE. Yes. Before I give you specific figures, the position I take is that what is really needed, in addition to the experimental studies that have taken place in various localities, is the fundamental understanding of how the atmosphere works. That is where our stress will be under these budget conditions. Some weather modifications research programs have been completed, such as in Florida. These reductions are an attempt to reduce the budget, which the Nation's economic situation demands, but also insure that the fundamental research activities that go on throughout the atmospheric side of NOAA are continued. We can provide you with information specifically with respect to the budget on a project-by-project basis, and I would be pleased to submit that for the record if that is appropriate.

[The material referred to follows:]

The following five elements, which make up NOAA's present weather modification research program, will be eliminated as a result of the fiscal year 1983 cuts:

The Florida Area Cumulus Experiment ($935K) is designed to determine whether dynamic seeding can augment convective precipitation over a substantial area of South Florida by promoting the growth and organization of summer cumulus systems. Seeding experiments were conducted during eight summers between 1970 and 1980, and statistical analyses of the results are nearly completed.

The Federal-State Cooperative Program ($300K) was started as a result of a Congressional add-on to the NOAA fiscal year 1980 budget. Its objective is to develop nationally applicable evaluation technololgies for two types of precipitation enhancement based on the North Dakota and Utah on-going State-sponsored operational projects.

The Cumulus Dynamics and Microphysics Program ($1,150K) is a long-term basic research effort begun in 1981 to understand convective cloud processes and to provide an improved scientific basis for precipitation enhancement experiments. The main objectives are to gain fundamental understanding of how cumulus clouds form, develop, organize, and interact with the environment and to determine how those processes react to seeding with artificial nuclei.

The Ice Crystal Processes Program ($669K), a 1982 initiative, proposes to use recent advances in numerical modeling of clouds and newly developed remote sensing instrumentation to understand how ice forms, propagates, and grows in clouds and to determine how seeding can influence these processes. Lack of understanding of ice crystal processes is the single most important obstacle to developing sound weather modification technologies.

The Hurricane Modification Research Program ($592K) consists of fundamental observations, analysis, and modeling studies of the structure, dynamics, and microphysics of the hurricane system.

In addition research flight services provided by the Research Facilities Center in support of weather modification field activities will be reduced by $500K.

Fundamental research on atmospheric problems and processes continues as part of our basic program to improve predictions and warnings of weather events. Our hurricane research program seeks to obtain basic insight into the nature and structure of tropical disturbances. The structure and dynamics of severe storms are studied in Oklahoma as part of the tornado research program. Cloud and mesoscale modeling studies are conducted as part of a major research program at the Geophysical Fluid Dynamics Laboratory aimed at understanding the physical laws governing the behavior of the atmosphere. Acid rain studies address questions concerning the mechanisms of cloud capture and deposition of acidic materials and other processes involving uptake and transport of the materials. In addition, the Wave Propagation Laboratory is continuing research to develop remote sensing techniques for measuring moisture, winds and cloud structure. Many results of this research to better understand processes of the atmosphere will have applications to weather modification objectives as well as to weather prediction.

Mr. BROWN. I think the record ought to have that information in it. I think it is clear that you have had to cut into the research programs quite substantially here, and while I think we would understand reasonable cuts in view of the budgetary stringency that faces us, I think we may feel that it has gone a little further than reasonable in some of those areas. We ought to be looking at the exact figures.

For example, I know how important you feel that university basic research is. I think I have some notes here that indicate cuts of perhaps as much as $20 or $30 million in university research. That is not going to fill up the slack for some of the cuts in your inhouse program if you are also cutting university research drastically. It might hurt some of the institutions that you are very fond of.

Dr. BYRNE. I can assure you, Congressman, that I will do what I can to see that does not happen. But you are correct, in terms of the numbers proposed. However, these are things which have already been identified as going to universities. As we are beginning to develop our relationships or redevelop or accentuate our relationships with the universities, I anticipate that we will see more and more support there.

Mr. BROWN. These are things that I know are not necessarily under your control. Let me ask you about some positive directions that we might go. I have been concerned, as have been other members of this committee, about whether or not we are adequately coordinating the work of NOAA with related research and weather work being done in the Department of Defense. If there is the possibility that by more effective coordination we could cut the resources involved, I think we would all benefit from that.

I wonder if you could give us just a quick view as to whether or not you think we have done as much as we could in effectively coordinating these two systems which might possibly be overlapping. Specifically on the polar orbiting satellite, you mentioned the possibility of some coordination with the Defense Department there.

Dr. BYRNE. Let me in general comment, and then we will address the question on the satellite.

The short answer to your question is "No," we are not doing enough. The efforts that we have underway—specifically, for example, with ship coordination—demonstrate very clearly that there is much more that we can do, not only in terms of how we schedule our ships but also in terms of who uses the ships and how we transfer funds in order to make better use of the ships.

With respect to the activities that we support in the universities in the area of the oceans, there is reasonably close coordination between what the Office of Naval Research funds within the universities, what the National Science Foundation funds, and the activities that we fund. Those are extramural programs for the activities that we have in the Weather Service; the Director of the National Weather Service serves as the Federal coordinator for meteorology and supporting research. The Federal committee is a group of policy individuals representing agencies that have activities that are ongoing, and includes members of the Department of Defense.

The Director of the Weather Service and the Director of Navy Weather Service meet on a regular basis. There is coordination or communication that is taking place. I think there is always more that can be done. We see close activity in certain projects at the worker level, at the scientist-to-scientist level.

In regard to the polar orbiting weather satellites, there is a difference in the data requirements of the Department of Defense and the National Weather Service (NWS). The National Earth Satellite Service provides the kind of information that is essential to NWS operation. I think we need to maintain civil operational capability with respect to satellites. So I would say that, although similar satellite systems exist, probably the trading is more in one direction than the other.

Mr. BROWN. Are there obstacles which the Congress could help to remove for the more effective coordination of the two meteorological systems? If you would care to respond in more detail later, I would be just as happy.

Dr. BYRNE. If I might have permission, I would refer that question to the Federal coordinator for meteorology and supply research, if that is permissible, or we could respond to it for the record.

[The material referred to follows:]

There are no current obstacles impeding cooperation between the civil weather satellite program and the Defense Meteorological Satellite Program (DMSP). We coordinate all aspects of the two programs, are developing a shared data processing system among NESS, AF, and USN; employ the same spacecraft "bus" design from the same manufacturer; mutually provide back-up service to meet essential needs when one program or the other has difficulties; and share weather data via an intricate set of communication links. An Air Force officer from the Air Weather Service is assigned to NESS to foster and extend close cooperation.

Mr. BROWN. Let me ask one additional question.

I am concerned about the elimination of the Fire Weather Service. It is not a major item: $800,000 it looks like. But I want to ask you a process question. You are proposing to eliminate the Fire Weather Service, and you are proposing to start a research project on the commercial potential of metallic sulphites, which also happens to be $800,000. I have nothing against this; I think it is a very promising area for research. How do you go about deciding that one is more important than the other, that you are going to drop one and start another?

Dr. BYRNE. There is one thing I want to correct, but I need to make sure I have the right facts. My colleagues can straighten me out. That was that we are not totally eliminating the fire weather program. We are closing a number of stations, but there will be others that are maintained. One of the activities that takes place with Fire Weather, of course, is the onsite activity when a forest fire occurs. My recollection is that we have about 21 mobile units, and we will reduce that to half but we will not totally eliminate these. So there is a little capability that will remain.

With respect to the process, this is one of the things that we are attempting to come to grips with in our 5-year plan. We have in the past, when budget reductions were appropriate, attempted to prioritize our activities and to make those sorts of determinations on a short-term basis. To me, this is less satisfactory than having a plan and set of goals to which we are striving. So that is part of our activity right now.

Mr. BROWN. We will look forward to hearing more about the development of your long-term planning process. That is a significant initiative, and I commend you for it.

I have no further questions.

Mr. SCHEUER. Congressman Wirth?

Mr. WIRTH. Thank you very much, Mr. Chairman, and thank you for allowing me to join the Science Committee again this afternoon.

Dr. Byrne, I wanted to ask you about the Space Environment Laboratory in Boulder. Are you familiar with the laboratory?

Dr. BYRNE. Yes, I am.

Mr. WIRTH. Can you tell us what the laboratory does?

Dr. BYRNE. Basically, the laboratory monitors flux or solar plasma as it impacts the magnetosphere that surrounds the Earth and the Earth system. We do two things in that laboratory. We provide a regular service with respect to the impact that solar disturbances have on our communications systems and the impacts on the magnetosphere. We also do a certain amount of fundamental research, or have in the past.

Mr. WIRTH. Who uses the research done by the Space Environmental Laboratory and the data that are collected there?

Dr. BYRNE. The results of the research are used by public utilities, by communications people, by those aircraft companies that travel in high altitudes, and certainly by the Department of Defense and the military community.

Mr. WIRTH. What was the budget last year of the Space Environmental Laboratory?

Dr. BYRNE. Last year the budget, if I can use an approximation, was about $7 million.

Mr. WIRTH. What is the budget being proposed at this time? I don't think it is that high, is it?

Dr. BYRNE. I am sorry. Last year it was approximately $5 million.

Mr. WIRTH. What is the administration proposing that the laboratory be funded at this year?

Dr. BYRNE. At this year's level, we would propose it to be about $2 million.

Mr. WIRTH. About $1.8 million; right? So it is being cut by $3.1 million?

Dr. BYRNE. That is correct.

Mr. WIRTH. Now, that leaves the laboratory effectively as a repository for data or essentially an archive?

Dr. BYRNE. No. I think we would plan on operating it at least on a part-time basis.

Mr. WIRTH. What happens to all of the users you were talking about before: public utilities, aircraft, navigation, satellite operations, Department of Defense, and research?

Dr. BYRNE. Right now we have ongoing activity at that laboratory with the Air Force. We will be working with the Department of Defense to see whether or not they can pick up the service aspect or help us with the service aspect.

Mr. WIRTH. So it would only be Defense. What about all the aircraft, all the 70,000 users of SEL?

Dr. BYRNE. My understanding is, they would benefit from the service——

Mr. WIRTH. How can they benefit from the service?

Dr. BYRNE. The major reduction in the laboratory is not in the service component but in the research component.

Mr. WIRTH. The NOAA budget justification states that the agency will attempt to transfer these functions to some other Federal agency, if one can be found which is willing to assume them; otherwise, it will be phased out. That is what the documentation says, justifying the $3.1 change. It is our understanding that is what the laboratory has informed all of those users, that it will either be transformed—not kept on a part-time basis, as you suggested in your testimony—but either transferred to other agencies or phased out. Now, which is the case: what you are telling us or what the laboratory has told all the users?

This is very important data, as you pointed out in your statement about what SEL does. We would like to know what is the plan for the laboratory.

Dr. BYRNE. The action that has been taken is that the Director of the Environmental Research Laboratories has contacted users in a recent letter—and we can provide you with a copy of that; I do not have a copy with me.

Mr. WIRTH. We have it, yes.

Dr. BYRNE. You know the date and the contents of the report——

Mr. WIRTH. We do, indeed.

Dr. BYRNE. Better than I do, sir. At any case, it is our intent to keep the service function of it going, if it is at all possible, and we will rely heavily on those Federal agencies which are major users of the service.

Mr. WIRTH. Did you have any consultation with the agencies as to whether or not, despite what they have said about it being phased out, of keeping it going on a part-time basis with a $3.1 million budget cut, leaving it with $1.8 million, which they have said leaves them in the process of being effectively an archive? Did you consult with them at all about doing this?

Dr. BYRNE. I would have to check with my colleagues to see what action was actually taken.

Mr. WIRTH. I can give you the answer to that, too, but why not ask your colleagues.

Dr. BYRNE. My understanding is that there was discussion at the staff level but not at the policy level.

Mr. WIRTH. Was there any discussion with Donald J. Williams, the Director of the laboratory who has the responsibility for running the laboratory, about this?

Dr. BYRNE. Yes, there was.

Mr. WIRTH. When did that occur? Could you document that for us, too, please, for the record?

Dr. BYRNE. We will attempt to.

Mr. **WIRTH**. Yes or no, will you. If you had discussions, you ought to be able to document it, if in fact it is the case.

Dr. **BYRNE**. I suspect there is noting in writing on it, which would make it difficult to document.

Mr. **WIRTH**. Would you then give us a rationale for how you decided to move from close to a $5 million to $1.8 million?

Dr. **BYRNE**. We would be pleased to do that.

[Material referred to follows:]

The Upper Atmosphere and Space Services subactivity in the NOAA Budget Request (page NOAA-169) is divided into three categories—observations, forecasts and warnings, and upper atmosphere and space research. NOAA, recognizing its responsibility to continue the essential solar-terrestrial services, decided to maintain the base level in the two services categories of observations and forecasts and warnings (as adjusted to the fiscal year 1983 base), a total of $1.844 million. Therefore, it was decided that the impact of the reduction determined in accordance with the Administration's policy guidance would fall on the third category of research, reducing the Space Environment Laboratory's research, new instrument development, system support services and data system upgrade by $3.1 million.

Mr. **WIRTH**. Could you tell us what the timetable is of the negotiations which you have referred to going on with other agencies about the transfer of the laboratory to other agencies? You just said you were in the process of discussing it with other agencies.

Dr. **BYRNE**. Not to transfer the service function but rather to incorporate their support to maintain that service function.

Mr. **WIRTH**. And what timetable are you under for doing that? Can you tell us what negotiations you have had?

Dr. **BYRNE**. I think that Dr. Ludwig is working on a 2 or 3 months' timetable to wrap this up.

Mr. **WIRTH**. Can you tell us what agencies you have contacted on that front?

Dr. **BYRNE**. We could provide you with the information on that. I don't have it at my disposal right now. We can add that to the record, if you would like.

[The material referred to follows:]

The timetable for contacting other agencies to discuss their willingness to provide funding support to enable NOAA to continue a level of solar-terrestrial services sufficient to meet the essential needs of all agencies is January through April, 1982. Initial discussions were held with DOD and NASA. Resolution of the level of services and contributory funding to support that level will be sought in the Subcommittee for Space Environment Forecasts of the Federal Committee for Meteorological Services and Supporting Research at a special meeting in April 1982.

Mr. **WIRTH**. It is a little bit difficult to understand, when the budget justification says that there is going to be this transfer, and yet you say, "We are having these negotiations to have it," or "We are going to phase out the laboratory which conducts a number of very useful services." It is very difficult to understand whether or not you believe that these services just ought to be cut out altogether. What if nobody has any funds forthcoming for this.

Dr. **BYRNE**. I suspect that if no one came forth with any additional funds, including the private sector or the other Federal agencies, this might be a demonstration that there is insufficient need for that information. I guess I am confident that we will find the support to keep the service element of that unit operating. I don't think I said "phase out the laboratory"; I think I said "phase out the research."

We feel we can do this because there is considerable research going on in this whole area, funded by the National Science Foundation and by NASA.

Mr. **WIRTH**. But none of that takes care of those 70,000 users of this information that are out there, or the Department of Defense, or the airlines, or the public utilities, and so on.

Dr. **BYRNE**. I agree, sir. You are absolutely right. That is the element of that unit's function that we will attempt to find support for, which would augment the $2 million that we have available in the 1983 budget for that activity.

Mr. **BROWN**. Let me go back to this. Not found in the budget document is the justification for cutting the $3.1 million out to begin with. We could not find it in the budget document. Maybe there is one for cutting the $3.1 million.

Dr. **BYRNE**. We will be pleased to provide you with that rationale for the record.

[Material referred to follows:]

The rationale for NOAA's decision to apply the reduction of $3.1 million to the Space Environment Laboratory's research, new instrument development, system support services and the data system upgrade can be seen in the structure of the line item budget requestion for Upper Atmosphere and Space Services. As I have said before, NOAA determined that the essential solar-terrestrial services program, listed (page NOAA-169) as observations and forecasts and warnings, for a total fiscal year 1983 base of $1.844 million, should be maintained.

It was determined that the Space Environment Laboratories research program fell below higher priority NOAA activities. The total $3.1 million cut was applied to the SEL research activities in order to maintain the designated SEL services functions.

Mr. **WIRTH**. Do you know where that rationale is? Has that been put together, or was this a Stockman special: let's just find something that looks like a target and take it out, even if it doesn't make any sense?

Dr. **BYRNE**. I am sure we will come up with a rationale.

Mr. **WIRTH**. We have heard an overwhelming amount from a great number of users, both utility people, airlines, and so on. I would think that there would be a rationale before you make a proposal, that the rationale or at least public policy would suggest that ought to be the case.

Dr. **BYRNE**. Our decision was to eliminate the research in that laboratory. That was NOAA decision.

Mr. **WIRTH**. Why eliminate the research in that laboratory?

Dr. **BYRNE**. Because in our estimation, looking at the budget reductions that were required and the other support for this type of research, the research activities that we carried out could be—if I may use the term—sacrificed because——

Mr. **WIRTH**. That is true supply-side economics, right? Let's not do any of the research that has to be done for the future of the country, that is used by user after user for economic growth in the United States; let's cut it out like we're cutting NASA, like we're cutting NSF, like we're cutting right across the board. It does not make any sense to me, but supply-side, "Let's spend it all on a B-1 or an MX" or whatever that may be. It just is crazy, Dr. Byrne.

This is a small item, I admit; in my backyard, I admit; but it is part of an overall pattern of no justification. Let us cut out the research because it is convenient to do so to try to arrive at a set of numbers.

Mrs. **Schneider**. Would the gentleman yield?

Mr. **Wirth**. I would be happy to yield.

Mrs. **Schneider**. This question reflects some of your questioning, but I am curious to know as to what degree there might be a reliance on user's fees that might be charged to, for example, the media or Defense Department or utilities?

Mr. **Wirth**. I think that is an excellent question. Was that examined in terms of cutting this out? I mean, I think you pay for what you get, and that is a constructive approach to be taking.

Dr. **Byrne**. May I respond, Mr. Chairman?

Mr. **Brown**. Of course.

Dr. **Byrne**. The other fact that I would like to get out on the table at this time is that in the 1983 budget, NASA has $180 million for research in this area, the National Science Foundation has $23 million, the Department of Energy has $6.9, the Department of Defense has $4.9, and Interior and the United States Geological Survey has $2 million, for a total of $216.8 million of research, which is a far larger research effort than NOAA has ever engaged in at that particular laboratory. That is not to indicate that we have not considered that research to be important research, but in terms of making budget reductions, and in view of those facts, our decision was based on an elmination of the research element of the program.

Mr. **Wirth**. I do not think that is what the budget document says. However, in reconsidering that policy, which I agree with you we ought to do, let me ask you one final question.

If we were to consider user fees, and you think that is a good idea, does NOAA have the authority to charge to user fees?

Dr. **Byrne**. We would probably require legislation on that.

Mr. **Wirth**. Have you come to the Congress or suggested doing that?

Dr. **Byrne**. Not as yet. The whole matter of user fees and the legislation required for that is presently being developed, and this would include the nautical charts, aeronautical charts, landsat user fees, and so on.

Mr. **Wirth**. Thank you very much.

Mr. **Brown**. Thank you, Mr. Wirth. It is always a pleasure to have an influential member of the budget committee to join with us.

Mrs. **Schneider**. Mr. Chairman, might I pick up on his line of questioning?

Mr. **Brown**. You may.

Mrs. **Schneider**. Now that you have itemized for us the various areas that are picking up on the research—Interior, NASA, et cetera—in your own personal opinion are you not concerned that since you will be the body delivering the service that this research might be too piecemeal? Where is the coordination effort that might be taking place in putting together all of this research that is being developed by all these different agencies? Are we going to have a high quality product at the end of this kind of approach?

Dr. **Byrne**. I think that in terms of the kind of service that is presently being provided, we do not have a problem. In terms of looking to the future and making the best use of research activities that are taking place, wherever they may be, we have essentially the same problem that we have with the oceans. We are addressing that, not only specifically with respect to the oceans, but, in a more generic sense, in terms of improved communication with the reorganization. Our attempt to provide a single focus for research within NOAA would give us not an assurance but at least a lead in the direction of compatibility of research effort.

Mrs. SCHNEIDER. Thank you very much.

Mr. BROWN. We also have another distinguished member, Mr. Sid Morrison from Washington, here. I recognize you, Mr. Morrison.

Mr. MORRISON. Thank you, Mr. Chairman. I appreciate the opportunity to join the subcommittee.

Dr. Byrne, just a couple of quick questions in answer to Congressman Brown about the efforts to be involved in local participation, some of the agricultural weather services, and particularly the fruit frost report sounded good. However, I found in my own district that weather service employees are indicating to me that they cannot share some of the information which they have as Federal employees with others who might be moving in a direction of disseminating that information to the fruit growers and other agricultural producers in the area. Can you clarify that picture for me?

Dr. BYRNE. The Director of the National Weather Service says that any information we have we share freely—at least if it is reproduced, at cost—with anyone who wants it. We have a communication problem, presumably.

Mr. MORRISON. I also want to mention that sometimes the Agricultural Weather Service's needs do not coincide with the Federal fiscal year. You did indicate to Congressman Brown that you would be ready by October 1 with some sort of a process whereby we would work through other agencies to make sure this was coordinated. I would hope that we could come up with a plan that would provide a maximum amount of time for this transition to private dissemination of your information.

Thank you, Mr. Chairman.

Mr. BROWN. Mr. Wirth.

Mr. WIRTH. Mr. Chairman, may I follow on briefly with a final question for Dr. Byrne?

Have you asked Dr. Ludwig, who is the head of ERL, to prepare any actions for the 34 people who work for SEL?

Dr. BYRNE. Not at this time.

Mr. WIRTH. Should he be preparing such documentation?

Dr. BYRNE. I think on an agency wide basis, we are looking at the impacts of any cuts on personnel. So the answer to your question is yes, we are moving in that direction.

Mr. WIRTH. When should the 34 people out there be prepared to be riffed? That would be a RIF action; is that right?

Dr. BYRNE. I think there would probably be some transfer of personnel and certainly some degree of riffing, yes.

Mr. WIRTH. When would he be preparing those kinds of documents?

Dr. BYRNE. It would be difficult to state, until we see just how we are restructured, which people would be riffed or which people would be transferred or possibly left in the same area involving the ERL laboratories in the Boulder area.

Mr. WIRTH. Would we be anticipating a RIF of 34 people between now and the end of the end of the fiscal year?

Dr. BYRNE. I do not think so.

Mr. WIRTH. There would not be a RIF then going on in fiscal year 1982?

Dr. BYRNE. Not to my knowledge.

Mr. WIRTH. So, therefore, Dr. Ludwig should not be preparing a RIF document related to the employees at SEL; is that right?

Dr. BYRNE. No. I think he should be preparing for the future, and if the future indicates that we are unsuccessful in securing support for that service, then it is clear that responsible management should be prepared to make that kind of reduction in force.

Mr. WIRTH. Then when do we expect to have a timetable as to whether you have been successful in finding outside support?

Dr. BYRNE. We certainly hope to know that before the end of the fiscal year.

Mr. WIRTH. So it would not make any sense for Dr. Ludwig to be going ahead with a RIF process until you knew what was going to happen with SEL; right?

Dr. BYRNE. However, one course of action is open. As I think most managers do, they attempt to manage for whatever eventualities might occur. One of these is certainly the eventuality that we do not find the additional funds, and we are forced to operate that facility on an 8-hour-a-day basis.

Mr. WIRTH. Then what advice would you have for this committee, given the fact that you will not know what is going to happen to the future of SEL until the end of this fiscal year, as you just said? What advice would you give to this committee, in terms of looking at the $5 million budget or $1.8 million for SEL, if you do not know until the end of the year? It sounds to me like the functions of this, by your first comments, are important enough that they ought to be kept going. What advice do we have, in terms of timing, from you? You put $3.1 million in there, but you will not know until the end of the fiscal year, this fiscal year, when the package might be put together.

Dr. BYRNE. I think the only indication you really have is the budget document that we submitted that says that we will provide support——

Mr. WIRTH. But that is contradictory from what you have said today——

Dr. BYRNE No, no, it is not contrary. It happens to be one end of the spectrum of what I have said today. We will be continuing to look for support for the service function of that facility.

Mr. WIRTH. You said you were just cutting research; is that correct?

Dr. BYRNE. Yes.

Mr. WIRTH. The budget document says you are cutting far more than that. We established that earlier.

Mrs. SCHNEIDER. Would the gentleman yield?

Mr. WIRTH. I would be happy to yield.

Mrs. SCHNEIDER. One thing that I would like to clarify, as a member of this committee, is that we are not in a position yet to stamp what is at this point a proposed budget. We are having hearings reviewing the President's proposals, but we have not as yet endorsed those figures. There is great concern in that regard. So I think that it would be premature for him to be working on the President's numbers until he has the word from us.

Mr. WIRTH. I think that is fully appropriate. Sometimes it is helpful to remind the people downtown that this is the way this particular Government operates.

Mrs. SCHNEIDER. I am just concerned about jumping the gun, and we have had quite a few weeks of hearings. There is much discussion as to what we are going to do as yet. But having heard the testimony and speaking with my colleagues, I would not at all recommend that we recommend to the administrator that he makes such moves, because I think that it would be out of line.

Mr. WIRTH. I appreciate the gentlelady's comments. However, I understand that what is going on in the district that I represent is that a laboratory where there are a lot of people there who have been told that RIF notices are being prepared, that will be out on the table the first of April or the first of May, and after they go to NOAA for approval they will be acted upon by the end of this fiscal year. But we really do not know what is going to happen to the laboratory, and there is an amount of uncertainty there. I was just trying to sort that out.

Maybe the best way to summarize all of this, Doctor, would be to make clear further questions we might have about that which you might submit back to the subcommittee, and we can then make that clear to the people out there who seem to be as confused as the administration is about the future of SEL.

Dr. BYRNE. We would be pleased to do that. There is one thing that I need to correct for the record, and that is that no RIF notices have been made.

[Material referred to follows:]

No reduction-in-force (RIF) notices have been prepared or issued. It is incumbent on management in facing the possibility of a program reduction to determine the cost impact that would be entailed. We have determined the essential services and personnel that could be retained if the fiscal year 1983 budget for SEL is reduced to $2.0 million, estimated the cost of salaries from October 1, 1982 until the need for issuance of RIF notices has been established and the cost of severance pay, and the number of employees eligible for retirement. Having established this essential management information, we will not take any further action until the level of the fiscal year 1983 authorizations and appropriations have been determined. If any RIF actions were to become necessary, every effort will be made to reassign the SEL personnel to other ERL laboratores in the Boulder area.

Mr. WIRTH. No, I did not suggest that RIF notices had been put out. The preparation documents are underway. One has a way in a bureaucracy, as you know, of finding out what is going on. Just that preparation puts out for people an enormous amount of uncertainty, and we are just trying to sort out that uncertainty for some constituents. Dr. Byrne, you understand that.

Dr. BYRNE. We will be pleased to cooperate with you in straightening out any uncertainty.

Mr. WIRTH. Good. That is what we want to do, and we will get your statement back to us in the record, and your justification for what is going on in SEL.

I thank you very much, Mr. Chairman. I appreciate your time.

On behalf of my constituents in Boulder, Colo., Doctor, we will look forward to getting your response.

Dr. BYRNE. We anticipate maintaining a high degree of presence in Boulder.

Mr. WIRTH. We are all in this supply-side business together, aren't we?

Mr. SCHEUER. I thank my colleague.

I would ask unanimous consent that any members may submit questions in writing for the administrator to answer in writing, since we are clearly not going to be able to get everybody's questions in the record today.

There being no objection, so ordered.

Dr. BYRNE. May I make one comment?

Mr. SCHEUER. Yes.

Dr. BYRNE. A correction for the record. When Congressman Wright testified, he left me with the impression that it was his belief that by closing the Fort Worth regional office we were affecting the services that the Weather Service provides. That is not the case. The closure of that office is simply a management function. We would move the headquarters personnel to Kansas City and to Garden City, N.Y., but in no way would any change take place with respect to weather forecasting or weather service.

Mr. SCHEUER. Fine. I am glad to have that clarified for the benefit of the majority leader.

Since you brought this question up, I cannot help noting that on February 8, the administration's fiscal year 1983 budget was released, with a proposal to cut out 45 weather service offices nationwide and to eliminate or substantially cut back on specialized services to agriculture, aviation, and forestry.

Now, not more than about 3 weeks after that, the administration reversed this decision and announced that the 45 WSO's would not be closed. Could you tell us what caused this reversal?

Dr. BYRNE. I think that a decision to close any number of weather stations, whether it be 45 or others, is a very serious decision. Frequently, it is a decision which is a very difficult one to make because the conditions on one side or the other do not seriously tilt the scale. Certainly, as we have progressed into the budget analysis and the analysis of our own activities and so on, I think it is the administration's belief that that was not a wise decision at the time it was made, which was some time prior to the actual release of that budget document.

I think there is a letter on its way to request those sorts of changes. We feel that we may possibly make the financial adjustments in other ways which would be less effective, in terms of impacting the Weather Service. If it were an easy decision to make, it probably would not have been changed. But the fact that it was a decision in which conditions were approximately but not quite equal, circumstances have, as they frequently do, come along which indicate to us that there are other priorities that might have been sacrificed at the expense of those weather stations.

Mr. SCHEUER. So you put the 45 weather stations back. Why did it not occur to you to put back the regional headquarters in Fort Worth?

Dr. **Byrne**. Our primary goal is to provide weather forecasting services which will benefit us in many ways, particularly with life and human activities. Our feeling is that the management function, the overhead function, if you will, is one which we would put as our lowest priority wherever we can. Now, we cannot always do that. But in looking at the restructuring of the weather service—we have four regions now. Basically we are looking at an adjustment of simply the management function, the procurement activities and so on, that occur on a day-to-day and a business fashion, and we are centralizing some of those that were located in Fort Worth, both in Kansas City and in Garden City, N.Y.

Mr. **Scheuer**. Centralizing them in Kansas City and in New York?

Dr. **Byrne**. Garden City. In other words, going from a four-region system to a three-region system, for management purposes, not for weather forecasting purposes.

Mr. **Scheuer**. From the point of view of management, in terms of your relations with Congress, I wonder whether you could not have seen some merit in keeping that Fort Worth station open. You have a managerial problem down here of major proportions.

Would you rather not answer that question?

Dr. **Byrne**. I am not sure I have an adequate answer for it, Mr. Chairman.

Mr. **Scheuer**. I honestly do not think you do, Dr. Byrne.

Now you talk about life and human activities being high on your priorities list. Many of us up here wonder why you continue to insist on the termination of specialized services to agriculture and industry that are critical to them. This is certainly involving human activities. Why have you cut out these special services? You heard a whole string of Congressmen protesting violently. I am saying that the private sector could not do it, and the Weather Service has no substitution. Are these men all wrong; do they have their facts wrong?

Dr. **Byrne**. I am not sure they are wrong. There is a difference of opinion, clearly. Our feeling is that the services we have, which appear to be eliminated, are those which we believe could be picked up by private enterprise. We will, throughout the agency, over the coming years, be looking at those sorts of activities that might enhance the economy of the country if they were being done privately, with some assurance that they will be done with the same degree——

Mr. **Scheuer**. I will tell you what I would like you to do, Dr. Byrne. We are all in favor of having the private sector pick up functions that Government otherwise would have to perform, and perform them at a profit and offer them more cheaply. You are not going to get much controversy on that down here. We have not seen these private sector people lining up for the privileges of carrying out these services.

There has been a lot of discussion in EPA, which had a drastic reduction of R. & D., on the environmental and health effects of our national priority push to find substitutes for Persian Gulf oil. We are moving toward coal gasification, coal conversion. We are moving toward synfuels. There are development programs involving hundreds of billions of dollars. It would seem that, if we are going to begin this absolutely quantum jump in energy production from our own sources, we would want to know the environmental and health effects. Yet, the EPA budget for energy R. & D., as well as the Department of Energy budget for energy R. & D., was cut about 75 percent.

We did hear testimony of experts from the private sector. We heard a whole string of them just yesterday, and they told us: In no way is the private sector going to pick up on this kind of energy R. & D.; it simply is not in the cards.

Now, I would like you to suggest to us a list of witnesses who would come in and testify to us that the private sector is prepared to pick up on these specialized weather services to agriculture, aviation, and forestry. We would be very happy to receive such a list, and we will hold a set of hearings, and we will listen to them diligently. I am sure it will fortify our belief, even our confidence that the private sector is ready to step in and substitute for the cut in these specialized weather services. Do you think you could give us a list of those people?

[Material referred to follows:]

The following list represents those private meteorologists who advertise agricultural services in their entries in the Professional Directory of a recent publication of the American Meteorologial Society. It is not an exhaustive list of all industrial meteorologists that provide, or intend to provide, agricultural weather services.

1. Weather Services Corporation
   131A Great Road
   Bedford, MA 01730

2. Climate Assessment Technology, Inc.
   6001 Gulf Freeway, Suite A-148
   Houston, TX 77023

3. Nash C. Roberts, Jr., Consultants, Inc.
   1040 N. Rampart Street
   New Orleans, LA 70176

4. Business Weather Service, Inc.
   2923 S. Macon Street
   Aurora, CO 80014

5. Weatherscan International
   5100 Brookline, Suite 780
   Oklahoma City, OK 73112

6. Felix N. Kogan, Ph.D.
   2809 W. Rollins Road #8
   Columbia, MO 65201

7. Florida Weather Service, Inc.
   31 S. Main Street
   Brooksville, Florida 33512

Dr. **Byrne**. We could make an attempt to do that, and I think it is a very reasonable request.

Mr. **Scheuer**. I think that since you are asking the Nation and the Congress to rely on the willingness of the private sector community to step in and play this role, I think that is a minimal request. I hope that will happen.

Mr. **Morrison**. Mr. Chairman, excuse me. If you might yield.

Mr. **Scheuer**. Yes, I will yield.

Mr. **Morrison**. I have a similar question that relates directly to Dr. Byrne's area. In my agricultural area, I do find that there are people in private industry who are willing to step in, where there is a direct correlation with the industry. It seems to tie in rather effectively. However, I do have on your list of forest weather stations to be closed one in Wenatchee, Wash., in which the Federal Government owns 2½ million acres of forest land right there, with a value of about $14.5 billion. Last year we had 174 fires in that national forest, 117 caused by weather conditions, and there is no way that private industry can step in and take over that particular service. It is in protection of the public interest. This is one where I am at a complete loss, even though we are willing to do our share, to find people who will step in and save those trees which really are in the public interest.

Dr. **Byrne**. That may represent an area where transfer to the private sector is not as appropriate as the establishment of a user fee. I am not sure what the actual method would be of laying out a user charge, but in that case, in the area where you have federally owned lands, I would assume that those agencies responsible for that resource would be the potential user. In that case, either the Bureau of Land Management or the Forest Service. Certainly, as we approach the matter of user charges, that is something that would have to be looked at. It is in an area concerning the matter of a Federal user as contrasted with a private user. It is being addressed for other types of user charges, most specifically the use of Landsat imagery. I think that is a valid comment and certainly that is something we would look at in this matter of user fee or private sector transfer.

Mr. **Morrison**. I hope, Doctor Byrne, we would get the concept in proper sequence: Let us not close the facility and lose the forest, and then expect them to come in with a tax structure to support it.

Mr. Chairman, I thank you very much for yielding.

Mr. **Scheuer**. Thank you.

I might say, in connection with the user service as being a way of lessening the burden on the taxpayer, we heard testimony from Bob Ryan and from John Coleman, two well-known national forecasters, that the market of private sector people who would be willing to pay for weather service was very very thin. They were not at all sanguine about the ability of the private agriculture and industrial community to make a significant contribution to the cost of these services. So if you have any suggestions as to witnesses of agricultural or industrial potential users of this service or purchasers of this service on a commercial basis, we would be very much interested in hearing from them, too.

[Material referred to follows.]

It is probable that cooperative associations representing groups of small farmers will assume financial responsibility for program services that suit the group's needs. The following list of such associations gives the larger organizations in some of the major agricultural areas:

Calavo Growers of California
4833 Everett Avenue
Vernon, CA 90058

Florida Citrus Mutual
P.O. Box 89
Lakeland, FL 33802

Michigan Association of Cherry Producers
678 Front Street, N.W.
Grand Rapids, MI 49504

Sunkist Growers
14130 Riverside Drive
Sherman Oaks, CA 91423

American Farm Bureau Federation
225 Touhy Avenue
Park Ridge, IL 60068

National Council of Farmer Cooperatives
1800 Massachusetts Avenue, N.W.
Washington, D.C. 20036

American Agricultural Editors' Association
P.O. Box 215
Mt. Morris, IL 61054

American Soybean Association
Box 27300
St. Louis, MO 63141

National Association of Wheat Growers
415 Second Street, N.E.
Washington, D.C. 20002

National Cattlemen's Association
P.O. Box 569
1001 Lincoln Street
Denver, CO 80203

Ag-Pilot Association
P.O. Box 18414
Las Vegas, NV 89114

Mr. SCHEUER. Now, for just a moment I would like to go from the sublime to the ridiculous. Normally, in these hearings that involve oceans and forests, dams, reforestation projects, little New York City never seems to get into the act at all. But here I can ask you something about New York City.

As you are undoubtedly aware, we have a problem of ocean dumping of our waste—solid waste, human waste, the rest. As you are also undoubtedly aware, in the Environmental Protection Administration enabling act of a couple of years ago, there was a prohibition on New York City disposing of its waste by ocean dumping after December 31, 1981, unless it could be proven that it was not environmentally unsound.

EPA did prohibit it, and New York City had to take EPA to court. A Federal district court ruled, just before the turn of the year, that EPA has to lift that prohibition; the prohibition was unreasonable and illegal because, the court said, it was not clear from the environmentally degrading effects of the alternatives to ocean dumping—namely, incineration and landfill—that ocean dumping might well be the least environmentally degrading way for New York City get rid of its waste products.

So, in effect, the Federal court mandated the EPA to conduct a cross-media research and development program, a top priority cross-media research and development program, cooperatively with NOAA, so as to adduce the comparative environmentally degrading and health degrading effects of the disposal of our waste: (a) Through ocean dumping; (b) through incineration; and (c) through landfill.

Just after you have been mandated by a Federal court to get cracking on producing enough research for the scientists at the Federal, State, and local level involved in environment to make a rational decision, and a cost-effective decision on which of these alternatives was the most rational and cost effective, you are telling us that you are cutting out all monitoring of ocean dump sites in the fiscal year 1983 budget, including the New York Bight site.

That impresses us as being contemptuous of a Federal court, of being very uncaring about New York City, and of being irrational as far as the Congress is concerned. How do you assuage all these fears and concerns?

Dr. BYRNE. We have no intention of being contemptuous—

Mr. SCHEUER. To the Federal court?

Dr. BYRNE. To the Federal court.

Mr. SCHEUER. Whether you are being contemptuous of Congress or not we will leave aside for another day.

Dr. BYRNE. And certainly——

Mr. SCHEUER. Are you being uncaring of New York?

Dr. BYRNE. No. In fact, that is the last thing we would be, Mr. Congressman. I can cite some of the other good things that we are doing with the Port of New York. It may be that in earlier questioning, when you were out of the room, we did address some of the budgetary situation with respect to the whole pollution and ocean dumping activity. The thing that we have eliminated, it is true, is the category that is listed in the budget as ocean dumping. However, there are several other categories which do address the fundamental questions involved with the introduction of substances to the marine environment. For all of the ocean disposal research in NOAA, the budget for 1983 comes to $12.9 million. Now it is clear that it is not specifically located at the dump sites off New York City, but it is more generally being assessed. I guess our feeling is that the fundamental knowledge is what is essential for application to any specific location.

Mr. SCHEUER. I do not understand why you are not dealing specifically with that New York problem, which is the most serious of all the ocean dumping problems we have.

I can tell you, I happen to know that Federal district court judge personally, Abraham Sofer, formerly a professor at Columbia Law School, and he can be a very irascible fellow. If I suggest to him that NOAA is acting in contempt of that Federal decision, he may be in touch with you. He may have to send out the marshal. We are trying to avoid that.

Dr. BYRNE. We appreciate that, too. The major research activity was completed, I believe, on schedule involving the dump sites off New York City. I think it was, to a certain degree, based on the results of the research that the judge probably took the position he did.

Mr. SCHEUER. Seriously, he did mandate the EPA and NOAA to conduct a cross-media research project and, in effect, to report back to the court as to their recommendations as to the comparatively most benign way, in terms of health effects and environment effects, of disposing of that waste. I really do find it inconsistent with that mandate for you to be closing down all monitoring of waste disposal in the New York Bight.

Dr. BYRNE. My understanding, Mr. Scheuer, is that we are not closing down all the monitoring activities, but I would be very pleased to provide a detailed response to that question for the record.

[Material referred to follows:]

Monitoring of the active dumpsites in the New York Bight has been conducted by NOAA's Northeast Monitoring Program (NEMP) since 1980. The NEMP is a planned system of physical, chemical, and biological monitoring carried out at 80 selected stations in waters of the northeast continental shelf from the Gulf of Maine to Cape Hatteras. The fiscal year 1983 proposed budget allows sufficient funding to continue the NEMP. The New York Bight dumpsites will continue to be monitored by NOAA under this program.

Mr. SCHEUER. Excellent. I will make sure that it gets passed on to this potentially very irascible Federal judge.

Let me just ask a couple of questions about weather satellites and your weather satellite policy.

For fiscal 1983, NOAA has proposed downgrading the polar orbiting weather satellite system from a two-satellite to a one-satellite system. I take it that this would mean a number of things, and I am going to give you a chance to correct me if I am ill-informed. I take it that this reduction would mean that data used in global weather modeling would be collected twice rather than four times daily?

Dr. BYRNE. That is correct.

Mr. SCHEUER. I take it that it would mean the provision of APT, which is automatic picture taking. APT data to over 120 countries around the world would be significantly reduced.

Dr. Byrne. It would be reduced; no question.

Mr. Scheuer. I take it that the accuracy of long-range weather forecasting would be likewise reduced?

Dr. Byrne. I think there is a debate there. There is a difference of opinion on that.

[Material referred to follows:]

Reducing the polar-orbiting satellite system from two satellites to one would reduce the data gathered. A single satellite passes within viewing distance of a given point on the earth in middle and low altitudes twice per day. In high latitudes the swaths along the satellite ground track tend to overlap to a greater degree than in lower latitudes but intervals of about 12 hours between picture mosaics occur. Upper air soundings can be observed by the satellite only within a restricted angle from the vertical under the satellite. Consequently, with a single satellite, gaps in data coverage occur in tropical latitudes. (A second satellite can be expected to cover these gaps).

If gaps occur within the data coverage, the analyses may have uncertainties in those areas. In the data voids of the oceans, particularly the oceanic tropics, and the Southern Hemisphere, no other data exist to fill in these gaps. Certain of the weather forecasting models require that a global analysis specify the initial state of the atmosphere upon which the model will operate. In principle then, if some uncertainty exists in the analysis this uncertainty will be transmitted to subsequent states calculated by the model. The uncertainty may or may not damage the results severely. A weather system large enough to be seen, even though incompletely, will be dealt with more or less correctly by the model. A weather system small enough to entirely lie within the data gap (which may be 10 degrees of latitude by 10 degrees of longitude in the tropics) may not be recognized by the analysis and the mode, for twelve hours or more. If rapid development is occurring it is unlikely to be missed on subsequent analyses but will have had that much time in which to develop unseen.

It can be seen from the foregoing that it is difficult to characterize the effect that such data gaps may have on long-range forecasting. Studies of a number of different situations representative of the spectrum of weather events must be made to precisely assess the effects of the data gaps. Our experience suggests that in some cases a small feature that is missed may have extreme ramifications for a forecast for a downstream area several days out into the model run performed at that time. On the other hand, a development will not go unrecognized for a long period of time, i.e., eventually it will be caught. In summary, it is possible to conclude that the potential exists for some adverse effect on long-range forecasting because of a reduction in data gathering.

Mr. **Scheuer**. Would you submit to us some explanatory material, perhaps giving both sides of that question?

Dr. **Byrne**. Sure.

Mr. **Scheuer**. Would this also mean that the accuracy of weather forecasting over oceans and over the southern hemisphere would be reduced?

Dr. **Byrne**. I think that is a reasonable assumption.

Mr. **Scheuer**. Would it also reduce—and here we come to your statement that you are very concerned about "life and human activity"—and we take you at your word; we think you really are.

Would this downgrading of the polar orbiting weather satellite system reduce the capacity of these satellites to fulfill nonweather missions, such as search and rescue, solar observations, and oceanic monitoring, but I am suggesting the search and rescue. In other words, would there be gaps there so that certain parts of the ocean would be unobserved for considerable periods of time, and that therefore human rescue in the event of catastrophe or disaster would be impeded?

Dr. **Byrne**. The search and rescue effort right now I think is considered to be an experiment. Clearly, if the experiment is successful, if we had only one satellite rather than two, we would not have the same sort of coverage. So, yes, I think the assumption is correct, that we would have a time lapse there with respect to coverage.

Mr. **Scheuer**. Specifically, what would be the impact of this reduction on weather forecasting over the oceans in the southern hemisphere and over the West Coast of the United States?

Dr. **Byrne**. My experts tell me that there would be no loss in accuracy; there would be a problem if we lost a satellite.

Mr. **Scheuer**. You mean it would be the only satellite that you have up there, so that you would have a no-satellite system?

Dr. **Byrne**. Yes. We would have no orbiting satellite.

Mr. **Scheuer**. If you lost the one satellite that you have up there, all of these things that I mentioned would be devastated, because you would have no fallback. You would have no failsafe system; is that correct?

Dr. **Byrne**. They would be severely degraded. Some would be eliminated; some would not. We would have to go through the list one by one, I think. With respect to weather forecast, for example, we do have the geostationary satellites, we do have land-based observations, we have a great many other techniques which contribute to the forecast for weather and so on.

Mr. **Scheuer**. All right. Let me ask you a few questions about several of your missions. Do you think that reduction to a one-polar system would harm the effectiveness of—and I am going to give you three—Agristars, a joint program aimed at providing improved commodity production forecasts for the major agricultural areas worldwide? I emphasize that in terms of the problems of population explosion, the critical problems of food production, this may be a very urgent, top priority program. Would this be wounded, let us say?

Dr. **Byrne**. I think it would be wounded.

Mr. **Scheuer**. What about the global cloud climatology program of the world climate program?

Dr. BYRNE. Yes. I do not think there is any question about that.

Mr. SCHEUER. What about the search and rescue mission? We are getting back here to "life and human activity." A search and rescue mission, designed to save lives of persons involved in aircraft or oceangoing boating activities?

Dr. BYRNE. Yes, and we addressed that question earlier. Clearly, it would deteriorate.

Mr. SCHEUER. NOAA currently provides satellite data to over 120 nations around the world, either through automatic picture transmission (APT) or via the global telecommunications system. What impact will termination of the one polar satellite have on weather forecasting worldwide?

Dr. BYRNE. I think it is safe to say that a loss of that or a reduction would impact—not eliminate, certainly—the accuracy, possibly, and the frequency.

Mr. SCHEUER. What impact would wounding these many agricultural, commodity, safety, weather, climate forecasting services have on our relations with the Third World. The President is extremely concerned about our relations with the nations of the Caribbean. He is a very compassionate man, and you are too. We are about the only resource they have, and they are fighting a desperate struggle—I say this with all seriousness—between food production and population explosion. If we take away this one professional forecasting resource that they have, how will this affect our relations with the nations of the southern hemisphere?

Dr. BYRNE. It is not clear that I can really respond to that question, because I am not an expert in this area, but it seems to me first of all that we are not speaking about elimination; we are speaking about a change in the quantity or the quality of the service from the polar orbiting satellite. So there would be some service provided. The degree to which that reduction in service would impact on our relationships is something I really cannot respond to.

Mr. SCHEUER. You do say that if we reduce it from a two-satellite system to a one-satellite system you would lose your so-called "safety net," if we can adopt an expression that comes to mind. When you lost your safety net, you had no further backup system, no further failsafe system. No. 1, how long would it take to replace that failed satellite; and No. 2, what is the statistical likelihood of such a failure occurring?

Dr. BYRNE. Dr. Calio has been sitting here for some time this afternoon without commenting. He is our expert on this, and so I would invite him to respond to those technical questions with respect to satellites.

Mr. SCHEUER. By all means. Any of the questions I have been asking, Dr. Calio, we would be very happy to hear your testimony on.

Dr. CALIO. Let me just comment that the design life of the polar orbiting satellites is about 2 years. To date, what we have experienced in the way of lifetime performances has been in excess of 2 years. The prototype that was launched back in 1978 was designed for 24 months' service and lived for something close to 27 months' service.

The plan is to launch the replacement satellite at 18-month intervals, approximately 6 months before the end of the design lifetime. In normal practice that we have experienced to date, the replacement spacecraft would be in orbit as a hot spare for the satellite that was about to end its life.

Mr. **Scheuer**. How long does it take you to get a satellite into orbit. Let's say if you had the failure——

Dr. **Calio**. I will get to that. Should that replacement satellite fail at the 18-month interval, we have an agreement with NASA to launch the next satellite which provides for 120-day call-up capability. In other words, they could not get a launch vehicle together and a launch complex cleared before roughly 4 months, and that is the agreement we have with NASA, that they should do it in that timeframe.

We currently have two satellites in the can, on the shelf, right now. If we should lose the next one in the launch phase, we would be prepared within 5 to 6 months after that to launch the replacement for it. We have experienced such failure. When we launched NOAA-E, it was lost in the launch process. So when we launch NOAA-D, the next one coming up, we will be able to do it, hopefully, before the current sequence expires; and if that fails, then we will have to wait 5 to 6 months, which will be the lifetime of the bird that is up there being replaced.

Mr. **Scheuer**. So you would have a 6-month gap, so to speak?

Dr. **Calio**. Not necessarily. That is what I mentioned. We are doing it on 18-month centers, not 24. The design life is 24. We are coming up 6 months before the end of design life to launch that spacecraft. If that fails, we have to wait 6 months, so we would be launching just at the expected time for the design life of that spacecraft to fail. So we have two shots at it, if everything works according to design lives.

The second part of the question: Have we done a probability analysis of this? We have not.

Mr. **Scheuer**. You just mentioned that you had one failure. Taking the total sum of experience in these orbited satellites, just give us a guestimate as to what the statistical likelihood would be of a failure?

Dr. **Calio**. I would have to look at NASA's statistics, and it is pretty good. It runs around 92 to 94 percent success rate. So that's a low probability.

Mr. **Scheuer**. What you are saying is that it might be a 6- or 8-percent risk that you would have something like a 6 months' gap?

Dr. **Calio**. And that degrades with time, yes.

Mr. **Scheuer**. OK. How serious would a 6-months' gap be, in terms of all of these forecastings?

Dr. **Calio**. If we had no polar orbiting satellite?

Mr. **Scheuer**. If you had none, nothing up there at all.

Dr. **Calio**. There would be no satellite data, polar orbiting satellite data, available to initiate the forecast models.

Mr. **Scheuer**. How damaging would that be?

Dr. **Calio**. Our accuracy would go down considerably, I would think. Right now, over the past decade or so, we have increased the forecast accuracy from roughly 1½ days to about 3 to 4 days. We would probably see a degradation back toward 1½ days' capability or less, and the errors would go up with that.

Mr. SCHEUER. How much money are you saving by going from a two-satellite to a one-satellite system?

Dr. CALIO. Over the entire time period, to 1992, it is something over $271 million.

Mr. SCHEUER. Over how many years?

Dr. CALIO. From now until 1992.

Mr. SCHEUER. So that is about a decade. You are talking about $27 million a year.

Dr. CALIO. Yes, sir.

Mr. SCHEUER. It is hard for me to quantify whether as an insurance matter, we ought to be self-insurers or we ought to pay the $27 million to cover our bets.

Dr. CALIO. That is the judgment call.

Mr. SCHEUER. Mrs. Schneider?

Mrs. SCHNEIDER. I have nothing further.

Mr. SCHEUER. This has been very interesting. As you can see, we have grave reservations about the cost-effectiveness of the wipeouts or these drastic reductions, and we will be considering them long and hard. You have been very patient, very forthcoming, and very interesting. We appreciate it very much. Thank you very much.

Mr. SCHEUER. The meeting is adjourned.

[Whereupon, at 4:45 p.m., the subcommittee recessed, to reconvene at the call of the Chair.]

APPENDIX I

ADDITIONAL STATEMENTS FOR THE RECORD

STATEMENT OF HON. VIRGINIA SMITH, THIRD DISTRICT, NEBR.

Mr. Chairman, I am submitting these remarks for the record because I could not be in two places at once. On this same date, I had the opportunity of questioning the Hon. Malcolm Baldrige, Secretary of the Department of Commerce, on the issue of his well-intentioned but misguided advocacy of closing 38 weather stations in 26 States, termination of the fruit-frost forecast program, and downgrading of eight major weather-service forecasting stations in fiscal year 1982.

So I had to make a choice of tending to the business at hand of my own Appropriations Committee and foregoing the privilege of taking part personally in your hearings. Therefore, I thank you for making it possible for me to at least make my case for the Valentine, Nebraska, weather station and to some degree for the other weather stations and other program on the chopping block.

I wish to share with the Subcommittee the background and intent of my bill, H.R. 6269, introduced on May 4, 1982, that would establish objective criteria and procedures for the orderly closing and consolidating of weather stations. The bill is patterned upon a law adopted in 1976 for closing and consolidating post offices.

I ask the Subcommittee's consideration of this measure, which, I believe, would at last remove from the list of political footballs the perennial issue of whether, when, and where weather stations should or should not be closed. I regret that I could not offer this bill sooner, but the research about past efforts and previous criteria, took more time than expected.

I have appealed—for the fourth time in five years—to my Appropriations Committee to keep my station and all the other stations open—but this time only until your Subcommittee, Full Committee, and the Congress has time to consider my bill. The Appropriations Committee has heeded my plea, so far, and we have bought some time.

Let me just interject here that although I have not yet had an opportunity to seek cosponsors, my good friend and colleague in the other body, the Hon. William S. Cohen of Maine, has introduced an identical bill, S. 2529, for which I am most grateful.

Because of the tremendous interest in this issue, I am confident that these bills will get appropriate consideration and support. No legislation is perfect, and I welcome suggestions and constructive amendments that the Subcommittee and other Members may offer.

In preparation for this hearing and those before the Appropriations Committee, I asked the Congressional Research Service to review all appropriate Congressional hearing records for the past five fiscal years, beginning with the comprehensive record of April 4 and 6, 1978, before Subcommittees of the Committee on Science and Technology.

The result of that research was hundreds and hundreds of pages of testimony by dozens of Members of Congress, public witnesses, and Administration officials about the question of whether and/or when a National Weather Service Station should be terminated. The review took many hours. The evidence clearly documents that this issue has commanded the attention of the Congress far out of proportion to the amount of money involved—less than five million dollars in assumed savings even if every one of the 72 different stations on four different "hit lists" over the past five fiscal years had been closed. The fact is, the Congress has refused to allow even one such station to be closed. A copy of the four lists is attached for the record.

If the time spent by my own staff in developing this issue so that I can make the best possible case on behalf of the people of Valentine, Nebraska, is any indication, then Capitol Hill staffers have invested an enormous total number of hours making the case for all these embattled stations over the years.

My bill and that of Senator Cohen are designed to put an end to this annual furor. It's true, however, that there are those, including Secretary Baldrige, who continue to ask, Why can't we just let these few little stations close in the interest of economy?

Quite simply, Washington bureaucrats really have no notion as to which stations, if any, can be safely closed without undue risk. Criteria used are only which stations have been deliberately undermanned and underequipped—starved of people, money, and other resources. I submit for the record a copy of Secretary Baldrige's letter responding to my request for details of his criteria used for deciding which stations should be closed.

Even the highest official in the National Weather Service hierarchy has confided that he dreads learning of the first bloodshed almost certain to occur beginning with the first undetected tornado that rips into an area deprived of proper weather service.

Let me be the first to acknowledge that perhaps technology is making some weather stations unnecessary. But what I hold is that Washington policymakers have no procedural way of knowing whether the weather data provided is essential or nonessential to the people being served.

I introduced my bill, H.R. 6269, on May 4, 1982, and it is pending before the Committee. A copy of the bill is provided for the record if the subcommittee sees fit to include it.

I believe it is a good bill, subject to perfecting as the Committee brings its wisdom and experience to bear upon it. It is patterned directly upon the system the Congress developed in 1976 for closing, consolidating, and opening new post offices. As is well known, closing post offices formerly was a political hot potato of the first order. Since passage of postal reforms in PL 94-421, the Postal Reorganization Act Amendments of 1976, a total of 279 post offices have been closed, consolidated, or converted into community post offices through the end of 1981. Generally speaking, it seems to take at least one year to close a post office under the new procedure.

Let me add that I do not presume to speak in behalf of the Members of the House and the Members of the Senate whose districts would be directly affected by the proposed closings of the 38 stations.

I can speak only about the weather station marked for closing in my district, in Valentine, Nebraska. There are those who make fun of me and other like-minded Members for our fight to save our weather stations while we call for cuts in programs affecting others.

In my frequent speeches and testimony on this subject, I have repeatedly suggested that the budget-makers have their priorities wrong. Instead of taking care of the real, basic needs of Americans, they insist on squandering millions and millions of dollars on long-range weather research with little or no payoff in terms of basic protection of lives and property. Much of it is just white-collar welfare and could be scrapped.

Indeed, my information is that the National Weather Service has been starved of money and personnel so severely that there have been no purchases of such basic instruments as rain gauges in the past three years, even though replacements are badly needed. The same is true, I am told, of telemetered river gauges for flood forecast information.

So I submit that Congress, harassed by firestorms of mail and telephone calls with respect to proposed weather-station closings, ought to insist that Washington bureaucrats and scientists should not be the only ones to decide whether weather data provided in specific communities, such as in Valentine, Neb., is vital for saving the lives and property in those communities.

Now, there is no test of need, no formal taking into account of outside experts, no public hearings, no proper notice. My bill would do all this so as to force the Government to take the views of the affected public directly and formally into consideration in pondering station closures.

Many members feel as I do about this issue. As evidence, I submit for the record, a copy of H. Con. Res. 319, introduced on April 22, 1982, and cosponsored by 33 Members of the House. This expresses the sense of Congress that these stations should be kept open until Congress can address the problem through my bill, H.R. 6269, or similar approaches.

This resolution is being attached in the other body to proposed authorizing legislation under consideration there.

I submit also for the committee's record a copy of the latest letter to President Reagan signed by more than two dozen Members of the House and Senate asking in vain for reconsideration of the closures.

In view of the fact that in five years, the Department of Commerce has failed to persuade the Congress to close even one weather station suggests that it is long overdue to find some way out of what increasingly looks like an impasse.

The procedures provided in my bill are not complicated or expensive—any costs being offset, theoretically at least, by savings from closing unneeded weather stations.

Here is how my bill's procedures would work:

(1) The Secretary of Commerce would be required to give at least 60 days notice to the affected community before the date of closure.

(2) The Secretary then must make a written determination on whether to close or consolidate, taking into consideration the effect on the community served by the weather station, effect on National Weather Service employes, the economic savings from closing or consolidating, and other factors. Hearings may be held as the Secretary may deem necessary.

(3) After the Secretary's written determination has been made available to the impacted community, no station can be closed for 60 additional days.

(4) Within the first 30 days of this additional period, any person served by the weather service station may appeal the determination to the Federal Committee for Meteorological Services and Supporting Research, an advisory body already in existence.

(5) This Committee must rule on the appeal within 120 days after receiving the appeal. It may affirm the Secretary's decision or order that the matter be returned for further consideration.

In summary, the bill provides procedures that requires the Government to take formal note of community concerns and to make their comments a part of the formal record.

The only criteria provided so far by the Department of Commerce for closing or changing the status of weather stations is quite simply whichever stations have been most undermanned and underequipped—not on need of an area for information, not on basis of whether the weather tends to be more dangerous in one region than in another. Indeed, no decision yet is based on any merit except alleged budget savings.

I will spare the House another rerun of my now set speech on the virtues of the Valentine Weather station. I fear that all too many of my colleagues know my story by heart: How Valentine, Neb., is located in the heart of the one of the harshest storm centers in the United States, how the Federal presence in the weather station there provides the core for the recruitment, training, and coordination of 75 weather spotters to detect the deadly tornadoes that strike repeatedly all year, how the closest radar stations are beyond effective range for detecting such severe weather, and how dependent our school children, our ranchers, and other citizens are upon the daily localized weather forecasts in Valentine.

I feel sure that if my bill were enacted, an objective analysis would result in a recommendation that the Valentine Weather Station should be upgraded to fulltime status, with the latest readar and other advanced technology.

If any of my colleagues have any questions about any of these matters, it will be my honor to attempt to respond.

Thank you.

WEATHER STATION "HIT LISTS" OF WSO'S TO BE CLOSED, FISCAL YEARS 1979–83 [1]

1979	1980	1982	1983
Bridgeport, Conn			
Trenton, N.J	Trenton, N.J	Trenton, N.J	
Mansfield, Ohio	Mansfield, Ohio	Mansfield, Ohio	Mansfield, Ohio.
Block Island, R.I	Block Island, R.I		
Lynchburg, Va	Lynchburg, Va	Lynchburg, Va	
Parkersburg, W. Va	Parkersburg, W. Va	Parkersburg, W. Va	
Fort Myers, Fla	Ft. Myers, Fla	Ft. Myers, Fla	
Orlando, Fla			
Rome, Ga	Rome, Ga	Rome, Ga	
Colorado Springs, Colo			
Clayton, N. Mex	Clayton, N. Mex	Clayton, N. Mex	
Roswell, N. Mex	Roswell, N. Mex	Roswell, N. Mex	
Valentine, Nebr	Valentine, Nebr	Valentine, Nebr	
La Crosse, Wis	La Crosse, Wis	La Crosse, Wis	La Crosse, Wis
Long Beach, Calif			Long Beach, Calif.
Stockton, Calif		Stockton, Calif	
Elko, Nev	Elko, Nev	Elko, Nev	Elko, Nev.

WEATHER STATION "HIT LISTS" OF WSO'S TO BE CLOSED, FISCAL YEARS 1979-83 [1]—Continued

1979	1980	1982	1983
Burns, Oreg	Burns, Oreg	Burns, Oreg	
Milford, Utah	Milford, Utah	Milford, Utah	
	Sandberg, Calif		
	Mt. Shasta, Calif	Mt. Shasta, Calif	
	Sexton Summit, Oreg		
	Blue Canyon, Calif		
	Alexandria, La	Alexandria, La	
	Stampede Pass, Wash		
	Kearneysville, W. Va		
	Unalakleet, Alaska	Unalakleet, Alaska	Unalakleet, Alaska.
		Homer, Alaska	Homer, Alaska.
		Flagstaff, Ariz	Flagstaff, Ariz.
		Bakersfield, Calif	Bakersfield, Calif.
		Bishop, Calif	
		Oakland, Calif	
		Red Bluff, Calif	Red Bluff, Calif.
		Santa Maria, Calif	Santa Maria, Calif.
		Alamosa, Colo	Alamosa, Colo.
		Pueblo, Colo	Pueblo, Colo.
		Kahului, Hawaii	Kahului, Hawaii.
		Lewiston, Idaho	Lewiston, Idaho.
		Cairo, Ill	
		Dubuque, Iowa	Dubuque, Iowa.
		Havre, Mont	Havre, Mont.
		Klamath Falls, Oreg	
		Williamsport, Pa	Williamsport, Pa.
		Reading, Pa	
		Aberdeen, S. Dak	Aberdeen, S. Dak.
		Walla Walla, Wash	Walla Walla, Wash.
		Elkins, W. Va	Elkins, W. Va.
		Sheridan, Wyo	Sheridan, Wyo.
			Tupelo, Miss.
			Youngstown, Ohio.
			Port Arthur, Tex.
			Newark, N.J.
			Springfield, Mo.
			Lansing, Mich.
			Allentown, Pa.
			Lincoln, Nebr.
			Chattanooga, Tenn.
			Grand Rapids, Mich.
			Bridgeport, Conn.
			Rockford, Ill.
			Rochester, N.Y.
			Valdez, Alaska.
			Olympia, Wash.
			Kalispell, Mont.
			South Bend, Ind.
			Tallahassee, Fla.
			Flint, Mich.
			Chicago, Ill.
			Washington, D.C. (Dulles).
			San Francisco, Calif.
			New York, N.Y. (JFK Airport).
			New York, N.Y. (LaGuardia Airport).

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[1] No closures recommended for fiscal year 1981.

Source.—Hearing records of Appropriations Subcommittee on Commerce, Justice, State, et cetera.

THE SECRETARY OF COMMERCE
Washington, D.C. 20230

APR 21 1982

Honorable Virginia Smith
House of Representatives
Washington, D.C. 20515

Dear Virginia,

Thank you for your letters concerning the closing of the Weather Service offices. Congress and the Department of Commerce should try to defuse the highly emotional, political issue of closing weather offices. We share the same concerns and goals in this matter, but we differ in the methods to achieve these goals. The major considerations in the efficient operation of a weather office network are the scientific and technological capabilities to provide weather services to an area. These considerations suggest that we should base our assessments on the location of field service offices on a long-range plan which takes into account developing scientific and technological capabilities. The National Weather Service (NWS) is developing such a plan. This NWS field reorganization plan deals with the field office network for the late 1980's and is based solely upon service requirements and service capabilities.

The NWS field reorganization plan will provide the organized rationale for the structure of the field services in the future. To the extent that available funds and personnel ceilings allow, I do not intend to propose further closings of general service weather offices until the reorganization plan is approved.

Advances in the science of meteorology and in technology have already reduced the importance of many of the smaller weather offices. The NWS has established uniform criteria for identifying weather offices of lower national priority. The major considerations are the provision of essential public weather forecasts and warnings and the maintenance of the radar and upper air observation networks. The criteria have not materially changed since the fiscal year 1979 budget sumission. In fiscal year 1979, we did exempt offices having the NOAA Weather Radio (NWR) programming responsibility. The NWR is no longer a consideration as we have found that NWR programming can be sucessfully carried out remotely. Enclosed is a copy of the office closing criteria you requested.

Sincerely,

Secretary of Commerce

Enclosure

National Weather Service
Criteria for Closing
Weather Service Offices

I. Part-time Weather Service Office (WSO)

1. General Service WSO with no original special program forecast services. Public forecast is a local adaptive forecast based on the Zone or area forecast.

2. Not routinely open 24 hours a day, 7 days a week.

3. Does not have either a network or local warning weather radar system operated by the office staff.

4. Does not take radiosonde upper air observations.

II. Full-time Weather Service Office (WSO)

1. General Service WSO with no original special program forecast services. Forecasts issued by office are local adaptive in nature based upon area forecasts.

2. Does not have either a network or local warning weather radar system operated by the office staff.

3. Proximity (within 125 miles) to another full service office which could assume most of the major non-local programs of the WSO.

4. Scope of office program--all but local public service functions could be transferred to another office.

5. All observation functions could be contracted for.

III. Full-time Aviation Weather Service Office (WSO)

1. Primary office function is for aviation services.

2. Local public functions are or could easily be provided by a nearby office. No, or only minor, public warning or forecast functions.

3. All aviation functions, including observations could either be contracted for or provided by another office.

97TH CONGRESS
2D SESSION

H. R. 6269

To establish objective criteria and procedures for closing and consolidating weather stations.

IN THE HOUSE OF REPRESENTATIVES

MAY 4, 1982

Mrs. SMITH of Nebraska introduced the following bill; which was referred to the Committee on Science and Technology

---

A BILL

To establish objective criteria and procedures for closing and consolidating weather stations.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. The Secretary of Commerce (hereinafter in this Act referred to as the "Secretary") in making a determination as to the necessity for the closing or consolidation of any weather service office, shall provide adequate notice of his intention to close or consolidate such weather service office at least sixty days prior to the proposed date of such closing or consolidation to persons served by such weather service office to ensure that such persons will have an opportunity to present their views.

SEC. 2. (a) The Secretary, in making a determination whether or not to close or consolidate a weather service office, shall consider--

(1) the effect of such closing or consolidation on the community served by such weather service office;

(2) the effect of such closing or consolidation on employees of the National Weather Service employed at such office;

(3) the economic savings to the National Weather Service resulting from such closing or consolidation; and

(4) such other factors as the National Weather Service determines are necessary.

(b) In making a determination under subsection (a) the Secretary may hold such hearings as he deems necessary.

SEC. 3. Any determination of the Secretary to close or consolidate a weather service office shall be in writing and shall include the findings of the Secretary with respect to the considerations required to be made under section 2. Such determination and finding shall be made available to persons served by such weather service office.

SEC. 4. The Secretary shall take no action to close or consolidate a weather service office until sixty days after his written determination is made available to persons served by such weather service office.

SEC. 5. A determination of the Secretary to close or consolidate any weather service office may be appealed by any person served by such weather service office to the Federal Committee for Meteorological Services and Supporting Research (hereinafter in this Act referred to as the "Committee") within thirty days after such determination is made available to such person under section 3. The Committee shall review such determination on the basis of the record before the Secretary in the making of such determination. The Committee shall make a determination based upon such review no later than one hundred and twenty days after receiving any appeal under this section. The Committee shall set aside any determination, findings, and conclusions found to be—

(1) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with the law;

(2) without observance of procedure required by law; or

(3) unsupported by substantial evidence on the record.

The Committee may affirm the determination of the Secretary or order that the entire matter be returned for further consideration, but the Committee may not modify the determination of the Secretary. The Committee may suspend the effectiveness of the determination of the Secretary until the final disposition of the appeal.

Additional cosponsors: Mr. Daschle, Mr. Heftel, Mr. Lujan, Mr. Chappie, Mr. Ertel, Ms. Oakar.

IV

97TH CONGRESS
2D SESSION

H. CON. RES. 319

Expressing the sense of Congress concerning the proposed closure of certain National Weather Service offices.

IN THE HOUSE OF REPRESENTATIVES

APRIL 22, 1982

Mrs. SMITH of Nebraska (for herself, Mr. ROBERTS of South Dakota, Mr. SCHUMER, Mr. SKEEN, Mr. FOLEY, Mr. LONG of Louisiana, Mr. HOPKINS, Mr. GUNDERSON, Mr. MORRISON, Mr. EMERY, Mr. PASHAYAN, Mr. LAGOMARSINO, Mr. THOMAS, Mr. HUBBARD, Mr. FOGLIETTA, Mr. MOLLOHAN, Mr. GIBBONS, Mr. EMERSON, Mr. BAFALIS, Mr. SIMON, Mr. AKAKA, Mr. KILDEE, Mr. SHAW, Mr. LEWIS, Mr. SILJANDER, Mr. OTTINGER, Mr. YATRON, and Mr. KOGOVSEK) submitted the following concurrent resolution; which was referred to the Committee on Science and Technology

CONCURRENT RESOLUTION

Expressing the sense of Congress concerning the proposed closure of certain National Weather Service offices.

Whereas over the past five fiscal years, at least seventy-two National Weather Service offices have been designated for termination ostensibly for budget economy reasons;

Whereas the Congress has consistently rejected these proposed terminations on the ground that the lives and property of many citizens of the United States would be jeopardized thereby;

Whereas the need for accurate collection, processing, interpretation, and dissemination of weather data increases with the growing population and the complexity of the economy, especially as it relates to agriculture and aviation;

Whereas the proposed weather service office closures would be carried out without formal consultation with State, local, and other community leaders, nongovernmental weather professionals, or the general citizenry; and

Whereas the Secretary of Commerce has failed to properly establish appropriate procedures or objective criteria for evaluating the need for weather service offices: Now, therefore, be it

Resolved by the House of Representatives (the Senate concurring), That it is the sense of Congress that no weather station or weather service office of the National Weather Service should be closed nor should any reduction in personnel assigned to any such facility be carried out until such time as the Secretary of Commerce establishes appropriate standards, principles, and procedures, including formal hearings, comment periods, public notice, and other appropriate means of presenting evidence, views, and opinions, relating to any proposed closure or consolidation of a weather service facility.

VIRGINIA SMITH
[illegible] District, Nebraska

[illegible] Rayburn Building
(202) [illegible]

Congress of the United States
House of Representatives
Washington, D.C. 20515

COMMITTEE:
APPROPRIATIONS
SUBCOMMITTEES:
AGRICULTURE
ENERGY AND
WATER DEVELOPMENT

February 2, 1982

Honorable Ronald Reagan
President of the United States
The White House
Washington, DC 20500

Dear Mr. President:

Once more we feel it urgent to ask for a reconsideration of your decision to close 38 part-time National Weather Service Offices, as proposed on page 67 of your April 1981 Budget Revisions for FY 1982, entitled: Additional Details on Budget Savings.

A continuing resolution has allowed these offices to remain in operation at least through March 31, 1982. As you can see, we are fast approaching this expiration date, and at this time the Senate has not approved the regular Appropriations Bill for FY 1982 that funds the National Weather Service.

We cannot stress enough the importance of these weather stations, which are located in areas of frequent severe storms, including tornadoes, whose effective detection is most certain through human--not electronic--observation.

It was our assumption in our previous letter of July 27, 1981, that the Congress would pass the regular appropriations bill by the end of the first session, and that we would gain administration and Congressional support in the course of consideration of the bill. It is due to the fact that this option appears no longer open that we feel our only recourse is to appeal again to your common sense. It would seem only logical that the government should stretch out or end some extravagant and esoteric research programs, such as weather modification, in order to concentrate on saving lives and valuable property by keeping qualified human weather service personnel on the job indefinitely.

Because time is running out so quickly, we would appreciate prompt action be taken to continue these weather stations.

With best wishes, I am

Most sincerely,

V. Smith
VIRGINIA SMITH
Member of Congress

K Bill Emerson
BILL EMERSON
Member of Congress

Tom Daschle D
Thomas A. Daschle

Paul Simon D
Paul Simon

Tom Foley D
Tom Foley

Cleve Benedict R
Cleve Benedict

Gus Yatron D
Gus Yatron

Harrison Williams Jr. D
Harrison A. Williams, Jr.

James Abdnor R
James Abdnor

J. J. Exon D
James J. Exon

Steve Gunderson R
Steve Gunderson

Gillis Long D
Gillis Long

D Robert H. Mollohan
Robert H. Mollohan

D Larry P. McDonald
Larry P. McDonald

D
Allen E. Ertel

R Larry Pressler
Larry Pressler

R Barry Goldwater
Barry Goldwater

D Edward Zorinsky
Edward Zorinsky

D Jennings Randolph
Jennings Randolph

D John Melcher
John Melcher

R Jim Courter
Jim Courter

R Bob Lagomarsino
Robert Lagomarsino

VIRGINIA SMITH
3d District, Nebraska

[illegible]

Congreſs of the United States
House of Representatives
Washington, D.C. 20515

Committee:
APPROPRIATIONS
Subcommittees:
AGRICULTURE
ENERGY AND
WATER DEVELOPMENT

February 12, 1982

Honorable Ronald Reagan
President of the United States
The White House
Washington, DC 20500

Dear Mr. President:

We wish to add our support to the renewed appeal of many members of Congress sent to you on February 2, 1982, with respect to your proposal to close 38 part-time National Weather Service Offices, as proposed on page 67 of your April 1981 Budget Revision for FY 1982, entitled Additional Details on Budget Savings.

A copy of the February 2, 1982, letter is attached for your reference. We respectfully associate ourselves with the arguments in this letter, appeal for your reconsideration of the matter, and urge that all these stations be kept open indefinitely.

Sincerely,

Alan J Dixon
Alan J. Dixon
Member of U.S. Senate

John Glenn
John Glenn
Member of U.S. Senate

Bill Proxmire
William Proxmire
Member of U.S. Senate

L. A. 'Skip' Bafalis
L.A. "Skip" Bafalis
Member of U.S. House

Ed Jones
Ed Jones
Member of U.S. House

Ray Kogovsek
Ray Kogovsek
Member of U.S. House

Paula Hawkins
Paula Hawkins
Member of U.S. Senate

TESTIMONY OF
CONGRESSMAN L.A. "SKIP" BAFALIS
BEFORE THE
SUBCOMMITTEE ON NATURAL RESOURCES,
AGRICULTURE RESEARCH AND ENVIRONMENT
HOUSE SCIENCE AND TECHNOLOGY COMMITTEE
MARCH 3, 1982

Mr. Chairman:

As I am sure you are aware, Florida has experienced a second year of record below-freezing temperatures. However, this year the freeze and its damage to fruit and vegetable crops was far more extensive than last year. Recent estimates show a more than 15 percent loss to citrus growers and a more than 50 percent loss to vegetable growers. And I can assure you these losses would be even more devastating to Florida's agriculture had the frost warning service at the Ruskin weather station been eliminated as the Administration had requested last year. If Congress approves spending reductions for NOAA for fiscal year 1983 which would specifically eliminate the frost warning service at the Ruskin facility, I shudder to think of the disastrous result an unanticipated freeze would have on an enormously vital and productive sector of my District and the State of Florida's economy.

Florida ranks first worldwide in citrus production and second nationwide in winter vegetable production. My State alone furnishes fifty to sixty percent of the nation's fresh vegetable needs during winter and for some crops -- such as potatoes, sweet corn and Chinese cabbage -- Florida is the sole producer.

Farmers statewide depend on the Ruskin weather station for up-to-date and accurate reports on approaching cold fronts and storms around the clock. This information is critical during the main growing season -- November to March. And the acreage of land involved is massive: 850,000 acres of citrus; 400,000 acres of vegetables; 350,000 acres of sugar cane and 150,000 acres of commercial nurseries. Furthermore, these are billion dollar industries.

Growers cannot take chances. The availability of around-the-clock forecasting prevents unnecessary utilization of costly precautions to minimize freeze damage. This could mean ~~the difference in~~ millions of dollars in savings both to the industry and related services and to the consumer.

The Ruskin facility utilizes the most technologically advanced equipment to insure accuracy of weather reporting. Should Congress approve the Administration's proposed budget cuts for NOAA, the alternative for Florida farmers will be to seek the frost warning services from a private firm. However, it is well known that the services currently available through such private enterprises are far inferior in accuracy and clearly limited in availability.

Furthermore, compared to the cost to continue the Ruskin program -- $131,000 a year -- the charge quoted by private firms to citrus growers alone is staggering -- $117,000 for just the five-month Florida freeze period. This fee does not include services during the hurricane and tornado seasons, nor does it include the additional costs for making the information available to vegetable growers and commercial nurserymen.

Therefore, while I certainly share the Administration's concern for reducing budget deficits and support their efforts to halt the growth of federal spending, I believe this is one example of OMB attempting to save money in the wrong area. And the amount of money we are talking about compared with the overall budget is very small.

Certainly this service does not favor one industry alone -- it also benefits those related marketing and processing industries as well as all of us who consume fresh winter produce.

In sum, I believe the continued operation of the frost warning service at Ruskin would serve a positive purpose. Until we can be absolutely sure that weather will be reliable, we need to provide our farmers with as much accurate information as we can to insure all of us an abundant supply of fresh fruit and vegetables through the winter months.

Thank you, Mr. Chairman.

BO GINN
FIRST DISTRICT, GEORGIA

WASHINGTON OFFICE:
[illegible] RAYBURN BUILDING
(202) 225-5831

COMMITTEE:
APPROPRIATIONS

SUBCOMMITTEE:
CHAIRMAN, MILITARY
CONSTRUCTION

Congress of the United States
House of Representatives
Washington, D.C. 20515

DISTRICT OFFICES:
ROOM 304
FEDERAL BUILDING
BRUNSWICK, GEORGIA 31520
(912) 264-4040

411 COTTON AVENUE
MILLEN, GEORGIA 30442
(912) 982-2525

ROOM 240
OLD POST OFFICE BUILDING
SAVANNAH, GEORGIA 31412
(912) 944-4074

March 11, 1982

Honorable James H. Scheuer
Chairman
Subcommittee on Natural Resources, Agriculture
Research and the Environment
A-821 HOB Annex 1
Washington, D. C. 20515

Dear Mr. Chairman:

Enclosed is a letter and statement from the Honorable Ray Shirley, Director of the Georgia Forestry Commission. I would appreciate your making Mr. Shirley's statement a part of your hearing record with regard to the National Oceanographic and Atmospheric Administration authorization request this year.

As you can see, Mr. Shirley's concern relates to the reductions in forest fire weather forecasting. Mr. Shirley suggests that great savings can be made through a regional system of forecasting. Reductions of the type proposed by NOAA, on the other hand, will probably result in agencies such as the U.S. Forest Service and the National Park Service being forced to fund a forecasting system of their own to protect federal lands. Presumably, that system would be more expensive and less efficient than one operated through NOAA.

Thank you for your consideration of this request. I am anxious to work with you on the Appropriations Committee in any way you wish.

With kindest personal regards, I am

Sincerely,

Bo

Enclosures

A. RAY SHIRLEY
DIRECTOR

Georgia Forestry Commission

BOX 819 MACON, GEORGIA 31298-4599

JIM L. GILLIS, JR.
Chairman, Soperton
T. FELTON DENNEY
Carrollton
ELEY C. FRAZER, III
Albany
PATRICIA ROBINSON
Atlanta
ROBERT SIMPSON, III
Lakeland

March 4, 1982

RECEIVED
MAR 8 1981
CONGRESSMAN GINN

Honorable Bo Ginn
Representative, District 1
2135 Rayburn House Office Building
Washington, D. C. 20515

SUBJECT: Forest Fire Weather Forecasting

Dear Congressman Ginn:

Yesterday, I talked with Robert H. Hurt concerning the 1983 budget for the National Oceanographic and Atmospheric Administration and the proposal for funding the Forest Fire Weather Forecasting Stations.

We are concerned about the reductions in forest fire weather forecasting that might eliminate this service to Georgia. Information we have received indicates NOAA proposes to reduce fire weather forecasting by approximately one half the present program. We are not requesting that the total reduction of funds be restored for this service, but a different forecasting system that would provide the needed services through regional offices rather than state-by-state forecasting. On the west coast, some states have two forecasting offices. Attached is our statement on need and and an alternate suggestion for continuing an effective program with less personnel and funds.

We appreciate your support in retaining this service on some reasonable basis.

Sincerely yours,

Ray Shirley

Ray Shirley
Director

RS:mjt

Attachment

cc: Honorable Jim L. Gillis, Jr., Chairman
Board of Commissioners
Georgia Forestry Commission
Mr. John M. Bethea, Chairman
Legislative Committee, NASF
Mr. Robert D. Raisch, Area Director
U. S. Forest Service
Mr. John H. Ohman, Deputy Chief
U. S. Forest Service
Dr. Richard E. Hallgren
NOAA-National Weather Service HQ

Equal Opportunity Employer

Statement by A. Ray Shirley
Director and State Forester
Georgia Forestry Commission
Macon, Georgia

On Behalf of Programming
Forest Fire Weather in the
National Weather Service

The Georgia Forestry Commission is vitally interested in having reliable forest fire weather forecasting data available for the forest landowners in the state. Forestry is of great value to the economy of Georgia and the nation accounting for approximately $6.6 billion annually. There are 25.5 million acres of forest land in Georgia; 24 million owned by private non-industrial owners and forest industry, 1.2 million by the Federal Government and 300,000 by the state and counties. The Forestry Commission spends approximately seventy-eight percent of its present budget of $22 million on forest protection (fire, insects, and disease).

Forest fire weather forecasts from NOAA are transmitted twice daily from the Georgia Forestry Commission Headquarters by Teletype to its fourteen districts. These forecasts in turn are transmitted by two-way radio or phone to all county and field stations within the district. The district and county offices relay these forecasts to forest industry and interested landowners. All fire operational plans are based on weather conditions, and personnel and equipment are governed by it.

Weather data is used to plan all work activities, not only fire and insect and disease operations, but also forest nursery and management activities. Georgia and other states in the south have a twelve-month forest fire problem. We need daily fire weather forecasting at least five days per week and under certain weather conditions, state and field offices are open seven days per week.

We realize the need to reduce federal expenditures. We believe the fire weather forecasting services can be provided by NOAA on a regional basis that will accomplish the budget and personnel reductions requested and still provide efficient service. We suggest a regional forecasting office that would serve a number of states rather than the present system where many states have fire weather forecasting services and some states have two or more. Regional or multi-state locations should accomplish the same purpose and possibly be more efficient. We are not suggesting where these regional offices might be located. That should be determined by NOAA.

The Federal Government has considerable federal lands in most states and the U. S. Forest Service and Bureau of Land Management should be interested in this type of structure since they have regional offices.

We therefore urge that you provide funds for regional forest fire weather forecasting and continue this important service to federal, state, and other users.

Statement by Donald L. McFatter
Assistant Secretary and State Forester
Department of Natural Resources
Baton Rouge, Louisiana

Before the
Committee on Science and Technology
Subcommittee on Natural Resources Agriculture
Research and Environment

February 23, 1982

Mr. Chairman and members of the subcommittee, I am Donald McFatter, State Forester of the State of Louisiana. I am the past president of the National Association of State Foresters (NASF) and presently co-chairman of the Legislative Committee of that organization.

I wish to thank you for this opportunity to express the views of the National Association of State Foresters on the subject of continued funding for the fire weather program. This program of the National Weather Service is of prime importance to the National Association of State Foresters and the Nation.

The NASF is composed of the directors of the individual State forestry agencies. The primary responsibility of these agencies is to conduct forestry work for the public good on State and privately owned forests within their respective States. The State Foresters, in cooperation with private, Federal and other State agencies and individuals work to direct and strengthen all forestry programs. Private and State forest lands comprise 780 million acres or 58 percent of the productive forest area in the United States. These lands are key to meeting future needs for wood products and other benefits both tangible and intangible. These privately owned forest lands are one of our Nation's greatest assets and provide public benefits far beyond the timber products or the recreational opportunities enjoyed by the landowners.

There are more than 1.5 billion acres of our Nation's lands involved in this decision to reduce fire weather services.

Million Acres	
780	Lands protected by State Foresters
420	Rural croplands, orchards and homesteads
350	Department of the Interior lands
190	National Forest lands

We hope this panel will consider this information in its deliberations as fire weather services are needed for the protection of all these lands.

Since 1870, the Nation's weather services have been considered the reponsibility of the Federal government. The service was first provided by the Army Signal Corps from 1870 to 1890, and then continued by the United States Department of Agriculture from 1890 to 1940. Since 1940 it has been provided by the Department of Commerce.

When the responsiblity for weather services was transferred to the Department of Commerce, it was widely assumed that all essential weather services would continue to be provided in support of agricultural needs. The State Foresters have developed timber production programs to meet the Nation's fiber needs, based on the assumption that the Department of Commerce would be a stable, reliable source of weather forecasts and climate information. One program in particular — the fire weather program — has benefitted the Nation and allowed State and Federal agencies to effectively protect the Nation's forests and rangelands from fire. History make this simple point — decisions on services have broad-reaching impacts on many levels of government and should not be made prior to a cooperative analysis of what those impacts are likely to be.

I would now like to alert you to some of the potential impacts of reducing fire weather program funding by relating to you some of the current services of great importance to the State forestry agencies. These services are also important to Federal land management agencies such as the Forest Service, Bureau of Land Management, National Park Service, Bureau of Indian Affairs, and U.S. Fish and Wildlife Service.

Forest and range fires cost the United States an average of more than $800 million each year in damage and suppression costs. They threaten life and property whenever they occur. Weather is the major factor in the occurrence, severity, and behavior of these fires; therefore, fire weather predictions are crucial in managing fires to limit loss of life, property, and natural resources.

The fire weather program is vitally important to all State and Federal wildland fire agencies. Weather conditions, along with topography and vegetation, comprise the major factors that govern fire occurrence and fire behavior. Of the three factors, only weather has any significant degree of variation in time, hence knowledge of weather conditions and their expected changes is absolutely essential for efficient, safe fire protection. Since organized fire suppression has been practiced in this country, the National Weather Service and its precursor agencies have provided the weather information needed to fight forest and range fires. We have always depended on the National Weather Service for fire weather services.

Today, most non-Federal and all Federal wildland fire agencies base their presuppression planning, manning, and initial attack strategies on the National Fire Danger Rating System. This system is driven by weather forecasts supplied by NWS fire weather forecasters. When large fires occur, on-site weather forecasts play a major role in determining safe plans for combatting these fires. NWS fire weather forecasters provide these on-site forecasts.

The fire weather program provided by the NWS has helped the State Foresters and American taxpayers protect the 780 million acres of State and private lands from wildfire. Within NWS a small but highly professional corps of fire weather meteorologists has played a prominent role in the protection of the Nation's resources and human lives.

Fire weather forecasters provide a number of highly specialized services during the fire season. Among the more important are:

. Daily fire weather forecasts
. Spot fire weather or special fire weather forecasts
. Fire weather warning or red flag alerts
. Mobile weather unit service

Controlled fire is used in several ways to manage the composition of the vegetative cover of the land. This use is termed controlled burning or prescribed burning and is done under safe burning conditions with strict controls to accomplish a specific purpose. In order to manage our forests to provide for the timber and the other renewable resource needs of our Nation, we base our prescribed fire use on NWS fire weather forecasts. These tell us how the fire will burn in a constructive manner. Some uses of controlled burning are:

1. Controlled burning of ground vegetation under pine plantations in the south to eliminate competition and thus provide faster growth of the trees.

2. Controlled burning of rangelands to eliminate the heavy thatch of old growth so that the new growth is more readily available for grazing by livestock.

3. Controlled burning of brush fields or small areas of forests to make more grass available or to change the cover to species of vegetation more desirable for wildlife in the area.

4. Controlled burning for hazard reduction. To reduce the accumulation of forest fuels during a safe burning period.

These are only a few of the ways that fire is used by land managers. In order to do a professional and safe job of prescribed burning, foresters and other land managers require accurate and current weather data from competent meteorological personnel. Good weather forecasts are an essential part of the burning prescription. The adverse effects of prescribed burning are limited to local visibility reduction. Studies have shown that the temporary visibility reduction is more than compensated for by reduced wildfire hazard and other benefits.

Smoke from prescribed burns which were conducted without adequate fire weather information and smoke from wildfires have reduced visibility to the extent that airports have been closed as have some highways. Several fatalities have resulted from auto accidents caused by smoke on the highways. Elimination of fire weather services could cause additional fatalities.

The proposed FY 1983 budget calls for a drastic reduction in the NWS budget for fire weather services. The FY 1982 budget of $2.7 million and 71 positions will be reduced by $800 thousand and 23 positions. In addition to the staff reductions, several fire weather offices are scheduled to close, mobile unit service will be cutback and prescribed-burning forecasts eliminated. It is in the national interest to continue full funding of the fire weather program. A reduction in fire weather funding or elimination of the services or facilities increase the risk of loss of natural resources, improvements and even lives.

On behalf of the National Association of State Foresters and the Nation I ask that funding for the fire weather program be continued at the Fiscal Year 1982 level of $2.7 million.

Thank you for the opportunity to present this testimony on behalf on the NASF and the Nation's forestry programs.

STATEMENT OF JAMES M. BROWN, PRESIDENT

AGRICULTURAL RESEARCH INSTITUTE

2100 PENNSYLVANIA AVENUE, N.W., #835 WASHINGTON, D.C. 20037

Area 202
659-2517

February 25, 1982

Re: Hearings on Agricultural Weather Services

Dear Mr. Chairman:

Under the proposed FY 83 budget for the National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA), all agricultural weather services provided by NWS will be discontinued. The Agricultural Research Institute (ARI) views with grave concern the consequences, both in relation to short-term and long-term impacts, of elimination of agricultural weather services.

The basic purpose of ARI is the furtherance of the quality and quantity of agricultural research to develop, supply and maintain an adequate technology to: (1) increase agricultural productivity and quality of foods, feeds, and natural fibers for the benefit of humanity taking into consideration the need to protect and improve the environment; (2) improve marketing and processing and enhance distribution; and (3) increase efficient utilization of foods, feeds, and natural fibers. The membership of ARI is open to corporations, associations, state agricultural experiment stations, federal agencies, academic institutions, scientific societies, foundations or individuals engaged in, or having an interest in the research, production, processing, transportation, distribution, or marketing of agricultural products and services, as well as organizations having an interest in the manufacture of supplies and equipment used in agriculture.

Weather is an all important factor affecting agricultural productivity. Accurate and timely weather information and advisories geared specially for agricultural users benefit all the people in the United States. Such weather services make it possible for the agricultural community to optimize practices to captialize on good weather and to react in numerous ways to reduce losses from bad weather.

Agricultural weather information is an essential input to the food-feed-natural fiber production system of this country that has continued to increase in productivity faster than any other major segment of our economy. This increasing productivity has resulted in U.S. consumers paying less of their disposable income for food than almost every other country. In addition, exports of U.S. agricultural products, which amounted to $44 billion last year, are a major positive factor in our Nation's balance of payments.

Elimination of agricultural weather services is proposed in order to cut the NWS, NOAA, Department of Commerce budget, or save the Federal Government, approximately $1.5 million. Yet, this shortsighted action will have a negative impact on U.S. food production resulting in higher food prices in our country and less food for export. The so-called $1.5 million savings can cost American consumers billions of dollars.

The Agricultural Research Institute (ARI) for many years has been a strong supporter of National agricultural weather services. We view such services as being essential to the future productivity of American agriculture. For years, ARI has had a very active Agricultural Meteorology Study Panel. It is made up of members from both the public and private sectors who understand the problems and needs in agriculture as well as the activities and technologies associated with gathering weather data, interpreting and disseminating for maximum effectiveness in agriculture.

During the past several years, ARI has worked closely with the National Weather Service in developing a National Plan for an even more effective agricultural weather services program that would serve all agricultural areas of the country. Just as the plans for this expanded program were nearing completion, the budget proposal to eliminate all federal agricultural weather services in 1983 was released.

American agriculture is broad and diverse, totalling several million farmers and ranchers involved in producing a wide variety of crops and livestock. The size of agricultural operations vary widely but most farms and ranches are family operations. Just as weather varies from one agricultural area to another, the specific agricultural weather service needs vary.

There is no way such a broad and diverse agricultural community can organize and effectively provide its own weather services. For the same reasons, federal agricultural weather services provided on a fee basis is not practical. Neither, can we expect private sellers of agricultural weather services to fulfill the weather service needs of American agriculture.

The Agricultural Research Institute requests that the comments presented in this letter be made a part of the hearing record. And, we trust that the hearings of your Subcommittee will lead to the conclusion that the short-term and long-term negative impacts on agricultural productivity are too great for the National Agricultural Weather Services program to be eliminated.

STATEMENT OF THE CALIFORNIA FARM BUREAU FEDERATION TO THE SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT COMMITTEE ON SCIENCE AND TECHNOLOGY WITH REGARD TO FEDERAL FUNDING OF NATIONAL WEATHER SERVICE PROGRAMS FOR AGRICULTURE

by
Henry J. Voss, President

April 27, 1982

The California Farm Bureau Federation (CFBF), representing over 94,000 member families and approximately 85% of the farmers in the state, is very concerned about the possible loss of federal funding for agricultural weather, fire weather, and fruit frost programs provided by the National Weather Service (NWS). All three of these programs must be included in one package due to the multiple function of NWS meteorologists in weather programs for agriculture. We feel that weather information is extremely important to farmers, especially those with frost sensitive crops, and that NWS is best equipped to provide this service at this time. We therefore oppose elimination of federal funding for these programs in this legislative session. Our opposition is due to the fact that the industry currently has no other means of obtaining services similar to those provided by NWS, and that both crop yields and quality will be reduced without this production tool.

We also oppose any reductions in federal funding for these programs for the following reasons: 1) the 1982 proposed budget for the fruit frost program, which is of utmost importance to between 1-3 billion dollars worth of California crops, was already reduced by one half and cannot stand any more reductions; and, 2) the classification system for both personnel and monies involved in agricultural and fire weather programs makes it extremely difficult to determine the actual impact of any reductions on specific programs at this time.

The National Weather Service has a long history of support to agriculture. In fact, it was a part of the U.S. Department of Agriculture from 1890 to 1940. It is ironic that, after fifty years of administration by an agricultural entity, elimination of weather programs for agriculture would be proposed.

What is actually being proposed? Elimination of a program means "to get rid of, set aside as unimportant, leave out of consideration, or ignore." Since the effects of adverse weather on agriculture and related activities has been estimated by the General Accounting Office (GAO) to cause yield reductions costing the nation as much as $9 billion annually, with direct crop losses alone of $1.6 billion a year, it is hard to believe that any service to curtail these losses is unimportant. While discussing definitions, it should also be mentioned that a reduction means "to lessen in extent, amount, quality, degrade, or bring from a higher to a lower condition." These descripters are exactly what would happen if any reductions were approved at this time. Agriculture may still receive a service, but it may be considerably less effective.

What is agricultural weather information? In California, the NWS takes into consideration elements that characterize the physical environment of the agricultural area and works closely with cooperative extension offices to tailor its services to local production. The following information is provided depending on the time of year and type of crops grown: frost warnings (utilizing numerous weather factors to estimate the degree of potential damage); soil and water temperatures; heat units (amount of time above a minimum temperature); air motion (wind speed, direction, and duration); dewpoint and humidity; type and direction of rains; evapotranspiration (amount of water loss from soil and plants); and degree hours for pest emergence. Farmers of the majority of crops grown in California use these reports to assist them in frost protection, livestock protection, planting, drying, spraying, harvesting, marketing, and irrigating decisions. In water deficit areas of California, accurate agricultural forecasts are essential to a water management program. Both the water district and farmers will utilize these forecasts in requesting the quantity of water needed for irrigation or frost protection practices. Related agricultural businesses need accurate weather information for marketing, processing, transportation, and other operations, such as aerial application of chemicals.

How does the general public and U.S. economy benefit from good agricultural weather information? The consuming public can obtain higher quality food at a lower cost due to increased agricultural production efficiencies. Both the public health and environment can benefit, also. The NWS has estimated that over 40% less sprays have been applied due to timely agricultural weather information. The fact that county governments in California have provided public funds of approximately $30,000 to local fruit frost programs indicates that they see a general benefit to all taxpayers.

The Winter 1982 issue of NOAA, the agency's quarterly publication, provided some additional insight on the weather service's impact on the nation's economy. The article indicated that specialized agricultural weather forecasts "... help keep production and operating costs down, factors ultimately reflected in lower consumer prices." Numerous examples were cited on the savings farmers realized from NWS weather information. These savings not only related to increased crop yield, but also in the use of pesticides, electricity, fossil fuel, and water. Agricultural weather forecasts effectively reduced air pollution from burning practices and enhanced both crop storage and transportation ability.

Are agricultural weather programs cost effective? The fruit frost program, which has been in existence for over 60 years, is rated by the NWS as one of its most cost effective programs. In an effort to develop user data to determine program efficiency, the NWS Western Regional Headquarters polled growers, grower organizations, land grant universities, and Cooperative Extension offices about the use of weather information to farmers. The response indicated that at least ten percent of the value of frost sensitive crops was attributed to good agricultural weather information and three to five percent of the value of the more general grain crops. This conservatively totals around 400 million dollars worth of benefit at a cost to the western region of less than 1 million dollars, or a benefit 400 times the cost. It has been documented that one accurate forecast in 1978 for the freeze in Tulare County, California, saved 25 million dollars worth of citrus. The forecaster involved cost approximately $35,000, a benefit of over 700 times the cost.

Can farmers use public forecasts instead? Although NOAA has indicated that public forecasts will continue to supply weather information, they are generally not accurate enough for farmers, are difficult to convert into farming decisions, and primarily cover urban areas. Also, both the NOAA Weather Radio and Weather Wire have limitations that significantly reduce their usefulness to farmers. Without the specific agricultural forecasts that have proven to be extremely beneficial to farmers, a major shift in production efficiencies could be expected along with increased use of pesticides, water, and energy.

Reduction or elimination of weather programs for agriculture is especially unfortunate at this time since the NWS has been working closely with the USDA over the past few years to develop and enhance expanded weather support to farmers. The GAO has repeatedly suggested that more funding is needed to increase the effectiveness of NWS agricultural programs. The USDA has stated that "improved climatological data forecasts provide tremendous potential for increasing the efficiency of agricultural production and reducing the risks associated with weather." As part of this improvement program, the NWS initiated "Environmental Studies Service Centers," which are now termed "Agricultural Service Centers," with the goal of providing full nationwide agricultural weather coverage. These centers, which are now slated for elimination were to serve as coordinating offices for the surrounding areas as follows: Auburn, Alabama (covering Alabama, Florida, Georgia); Stoneville, Mississippi (covering Arkansas, Louisiana, Mississippi, Tennessee); College Station, Texas (covering New Mexico, Oklahoma, Texas); and West Lafayette, Indiana (covering Illinois, Indiana, Kentucky, Michigan, Ohio, southeast Missouri). Offices for Agriculture were also set up in areas of more diverse agricultural production as follows: Yuma, Arizona (northern Arizona); Riverside, California (southern Arizona, California); and Twin Falls, Idaho (working on research with local land grant university).

These seven main agricultural stations are listed to underscore the impact of budget actions on all of the agriculture. The improved agricultural weather programs, or "agricultural advisories," that these stations were designated to coordinate, are in their infancy in many areas. Agricultural advisories were an improvement over the older "agricultural forecasts" and the NWS appeared to be heading in the right direction in their reorganization efforts. If the program is reduced or eliminated, the considerable amount of money and effort that has been invested by the NWS, USDA, and Extension Service over the last few years will have been wasted.

When discussing the impact of NWS agricultural program elimination or reduction, one must also take into consideration other agencies that are cooperating with NWS besides USDA and Cooperative Extension. In California, the University of California and the California Department of Food and Agriculture have been working with NWS to develop a statewide computerized network to provide weather data to growers for both irigation use and integrated pest management purposes. In an urban, water dependent state, increased agricultural efficiencies in these two areas are critical to all. The cooperating agencies may find themselves left without the main NWS support base in trying to set up this needed program, and they may have also wasted valuable time and money on a project that cannot be completed.

Our main concern is the need to maintain an assured funding source for quality agricultural weather, fire weather, and fruit frost programs. With the history of budget cut proposals for the fruit frost program in particular, local NWS administrators have had difficulties in both recruiting and maintaining high caliber, experienced personnel. This has had a detrimental impact on overall program quality and, without a vote of funding support, this quality may eventually deteriorate to a point that weather programs for agriculture are no longer functional.

It is especially difficult to discuss reduction or elimination of programs at this time since the actual personnel and dollars devoted to agricultural weather, fire weather, and fruit frost programs are not clearly visible. Historically, the separate fruit frost line item has been underestimated, since additional NWS personnel and money is devoted to fruit frost forecasts by agricultural and fire weather meteorologists in weather service offices. In discussions with NWS regarding program activities, we have found examples where fire weather personnel function as fruit frost forecasters for part of the year, and vice versa, which definitely enhances program efficiency but complicates budgetary concerns. We have also found examples of meteorologists classified as "agricultural" who either have not worked on agricultural programs for a number of years, or only devote a portion of their time to such functions.

We are confused by the Department of Commerce NOAA budget, which states that "agricultural programs will be eliminated" but includes $3.518 million and 47 positions devoted to agriculture after budget cuts and baseline adjustments. However, the NWS and NOAA sources have stated that there will be NO personnel for agricultural weather and that the remaining monies and personnel in the agricultural budget will be utilized in other areas. In the midst of this confusion, we would like to pose the following questions to NWS: What portion of the money and personnel in the NWS budget for agricultural weather have actually been utilized in providing the designated function? Why can't the remaining personnel and money in the FY 1983 budget be used for agricultural programs if, in fact, a 47 person, 1.1 million dollar cut is a total program elimination? If, as NOAA has stated, a large portion of these remaining personnel and funds are "cross utilized," why has the agricultural program budget paid their entire bill?

Farm Bureau, with its general policy of support for the President's 1981 Economic Recovery Program, has looked closely into the possibility of industry funding for weather programs affecting agriculture. We have found that the agricultural industry currently lacks a workable plan to totally take on the funding responsibility. The State of California may be facing a serious deficit, the private meteorological industry is small and uncoordinated at this time, and there are significant differences among agricultural industry members regarding both the feasibility and actual administration of user funding.

It should be emphasized to both the Department of Commerce and Congress that NWS programs for agriculture in California ALREADY HAVE a large amount of funding participation by the industry. Other specialized or general NWS programs may not have this type of support and should be closely examined. In 1980, at least $50,000 of the NWS fruit frost program was funded from either local agricultural commissioners' offices or industry contributions. This funding was either in providing offices, computer connections, telephone services, or in-kind assistance. In addition, grower volunteers have actively monitored temperature sensing units on their farms or ranches and reported in to the local NWS office on a daily basis. Many of these grower volunteers have participated in this manner for over thirty years. Within the last few months, some growers in areas losing their district fruit frost forecaster (due to proposed FY 1982 reductions), began purchasing remote sensing units to compensate for this loss at an investment of over $30,000. However, this computerized program depends on continued forecasts from personnel in the NWS Riverside Office for Agriculture, which is scheduled for closure. Overall, industry funding of the fruit frost program approached half of the $209,000 federal funding allocated in the NWS budget.

Last February, CFBF organized a series of meetings with agricultural interests in California to further investigate the possibility of coordinating industry, local, and private funding efforts to enhance weather programs for California agriculture. Although the meeting participants indicated a sincere interest in some type of additional industry support to provide the stable funding needed for quality programs, some serious problems were identified that may restrict expanded industry financial involvement. It was agreed that elimination of the program in FY 1983 would not provide the time needed to fully address these problems.

Without the NWS support base mentioned earlier, the cost to agriculture for a separate program appears prohibitive. The fruit frost program alone has been estimated to cost at least twice as much if operated separately from NWS, and this does not include the NWS and fire weather offices that also provide fruit frost forecasts by agricultural meteorologists. Also, without continued agricultural data gathering by NWS in district and weather service offices, the data base for private meteorological services would be reduced to a non-effective level. Before any additional user funding of weather programs can be considered, we feel that the agricultural industry must determine how the program can be administered as a public body to provide services to all farmers. The current dissemination of agricultural weather information on public radio, television, and direct phone lines provides the most opportunity for benefit compared to the cost of funding. If user fees were proposed, the problems of how money can be collected in an equitable manner, and how to provide services to each area commensurate to the money collected would also need to be solved.

CFBF has also discussed with NWS the possibility of contracting with it for weather services similar to those currently in operation. This would require both an Office of Management and Budget personnel waiver on the mandated ceiling and approval by the NWS administrators. Although this would definitely be more economical and effective than a separate program, it requires further investigation and in itself would not alleviate many of the problems related to expanded industry funding.

Due to the complications of industry funding and the critical need for agricultural weather information, the California Farm Bureau Federation requests that NWS agricultural weather, fire weather, and fruit frost programs remain fully funded for FY 1982 and FY 1983. In the coming year, further investigation is necessary on both the actual costs and personnel involved in providing agricultural weather services and possible ways to solve the problems of expanding industry funding.

In conclusion, we would like to reiterate that weather programs affecting agriculture are both essential for growers and the public welfare. These programs should continue to be upgraded and expanded, not eliminated or reduced. Agricultural weather, fire weather, and fruit frost programs should not be viewed as providing a special service benefiting a small segment of the economy. It is imperative that agriculture remain strong and profitable to avoid another reduction in the nation's income generating capability, produce food in abundance to feed the world's hungry, and contribute positively to the U.S. trade balance. Continued full federal funding, utilizing the National Weather Service, appears to be the fairest and most efficient way to provide weather information necessary to agriculture at this time.

PREPARED STATEMENT OF DR. FRED T. WEISS

I am Fred Weiss, a member of the scientific staff of the Shell Oil Company where I have had a number of research and technical assignments over the past 40 some years. I have long been an active member of scientific groups concerned with environmental science. These include the American Society for Testing and Materials (ASTM) where I have been vice-chairman of the Committee on Water and the American Petroleum Institute's Committee on Fate and Effects of Oil in the Environment. I am also a member of the Scientific Committee of the Bureau of Land Management's OCS Advisory Board. During the latter part of 1980 I served on the Evaluation Panel of the Interagency Committee on Ocean Pollution Research, Development, and Monitoring (COPRDM) and participated in the writing of the Report "Marine Oil Pollution: Federal Program Review".[1] I recommend the Report to the Subcommittee and believe its conclusions and recommendations on Oil Pollution Research should be significant to its deliberations. At several places in my statement I will refer to conclusions from this Report.

As requested I will initially comment on the nature of the scientific studies supported by the petroleum industry in ocean pollution research. I would like to draw both on the industry's experience and on scientific data available from laboratory and field studies concerning the impact of the petroleum industry on the ocean environment. Attached is the publication Oil and the Sea, which summarizes the research of the American Petroleum Institute (API) over the last decade.

The investigations summarized in this API publication relate to aspects of Oil and Marine Life: Laboratory Studies, Field Studies, Fate of Oil and Health Aspects. Individual field projects examined, amongst others, the impact of petroleum or petroleum operations on an Atlantic Coastal marsh, the Santa Barbara channel, on coral reefs and at Gulf of Mexico sites.

A large share of the initial API fundig was directed to the development of analytical and biological methodology which was then utilized to ascertain the levels of concern for petroleum in the environment. The results have been made widely available through many publications in the peer-review journals and by presentations at symposia, in some of which both the organization and funding was provided by Federal Agencies together with the API.[2,3,4,7] Many individual industry or industry-sponsored reports also have been made available covering field experience from both exploratory and long-term development activities. These include such topics as the impact of produced waters on the marine environment,[5] a survey of impact on the fisheries in the vicinity of a long-term producing field in coastal Venezuela[6] and the impact of an offshore exploratory well off Southern California[16,17]. To obtain data on the effect of Alaskan oils on Alaskan marine biota, the industry funded a project at the Auke Bay Laboratory of National Marine Fisheries Service in Juneau, Alaska.[8]

A reasonable question to ask is how have industry studies been utilized? Data from these studies have been required and used in the permitting process for each of the regulatory agencies involved. Industry and industry-funded studies have been widely referenced in the Environmental Impact Statements (EIS) on which, of course, the Interior Secretary relies to make leasing decisions. The studies have added to that increased level of knowledge of petroleum in the marine environment. The studies have also added new scientific specialists into the petroleum industry and created a significant level of understanding and appreciation for the marine environment throughout much of the industry.

Perhaps one of the most important conclusions from such work is the realization that laboratory studies be conducted with concentrations of components which relate to real-world situations. This need for conducting laboratory experiments with real-world concentrations was recognized and emphasized in the Interagency Committee Report.[1]

Well-conducted analytical and physical studies are exceedingly important to develop an understanding of natural processes. Such studies on hydrocarbons, their concentrations, their sources and their sinks[2] have provided important data on the expected effects of petroleum in the marine environment. For instance, it is now understood that the principal source of the heavier polynuclear aromatics is not from petroleum spills but from combustion sources.[9,11] Quantitative data are now available on the rates of weathering of the components from spilled oil.[10] The light components, including the more toxic aromatic materials, volatize very rapidly from the ocean waters.

An issue which should be addressed is the need for government-sponsored ocean pollution research. It is necessary to point out that much environmental knowledge is already available. The Interagency Report[1] stated that "the U.S. Government has spent well over $200 million on marine oil pollution studies". In addition, there has been work done by industry, by states and academic institutions over many years and by foreign governments, especially the Canadians in their Arctic regions. The amount of basic information is tremendous. We have a good understanding of many facts of the issues facing us. Excellent laboratory and field data are available to us. What should be done now is to review and synthesize the knowledge we currently have in any particular area in order to move ahead with the important issues ahead of us such as the Bureau of Land Management's (BLM) accelerated leasing schedule. The February meeting of the BLM-OCS Advisory Board provided the opportunity to pull together much of the information on several of the currently critical marine environmental topics.

Realistic field studies, where needed, can be made to ascertain the actual detailed impact of OCS petroleum operations. An example of this is the project conducted by the Biological Task Force (BTF) of the Georges Bank. The BTF is made up of technical representatives of the BLM, NOAA, USGS, USFWS, etc. This multi-agency group, with input from the states and academic scientists, has designed a multi-year monitoring program for Georges Bank to study the influences of petroleum exploration activities. Competent scientists from the Northeast have been contracted by BLM to conduct this study (e.g., Battelle and Woods Hole Oceanographic Institution).

Another field study, and a very interesting and significant one, is the survey of the Bowhead Whale herd in the Canadian Beaufort Sea. These whales spend their summers in the vicinity of petroleum operations in the MacKenzie Delta. Studies funded by BLM and by U.S. and Canadian petroleum operators indicate a relatively minor impact from noise, ship movement, island construction and drilling on these animals. It is during the transit of these whales across the Alaskan shelf area to their winter quarters south of the Bering Straits that the issue has developed in relation to U.S. OCS operations off the North Slope.

As was recognized in the Interagency Committee Report[1] (COPRDM), it is important that high quality laboratory facilities be maintained around the country to enable us to facilitate our national expertise for studies required for long term multiple use of the oceans. A continued development of sensitive analytical methods is required to establish the precision and reliability of results. As an example of work in this area, the American Society for Testing and Materials (ASTM) has a number of technical committees addressing environmental measurements and has been increasing its efforts in these directions under the leadership of scientists from academic, government and industry locations. Standard consensus methods are now available for many measurements, including hydrocarbons, organic compounds, trace metals and for bioassays.

It is important to review the state of the art in assessing questions which have specifically faced the petroleum industry. The disposal of drilling muds into the ocean environment has been closely examined over the past few years. Recent review reports prepared for the EPA and BLM[18,19,20] summarize an extensive literature which show that drilling fluids currently being used and discharged on the OCS have low toxicities and are rapidly dispersed. Consequently, drilling discharges have a negligible impact on open ocean water quality. Concern for the assessment of the environmental impact of oil spills has been reviewed extensively in symposia over the past few years[3,4] and was carefully examined by a working group of the National Academy of Sciences[15]. The general conclusion is that the immediate effects can be detrimental, the extent depending upon the size of the spill and the conditions of the location on which the spilled oil impacts. However, natural recovery processes such as evaporation, oxidation, biodegradation and the like begin to take place shortly after a spill and over a period of time the region recovers.[15]

Before finishing my statement I would like to comment on the excellent marine work carried out in a number of the laboratories of the National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA). For example, the Auke Bay, Alaska, NMFS Laboratory has examined the impact of Alaskan oil and drilling fluids on local marine biota.[2,8,21] The Tiburon, California, NMFS Laboratory has examined similar impacts on California species.[12] The Galveston, Texas, NMFS Laboratory has conducted an extensive study of an operating petroleum producing unit in the Gulf of Mexico.[13] Results from the Galveston NMFS study[13] and a similar Gulf of Mexico survey conducted by Southwest Research Institute[14] and funded by BLM show minimal impact of the petroleum industry in historic operating areas. The Southwest Research study pointed out[14] that natural perturbations, such as flooding in the Mississippi River and Gulf storms, have a greater impact on Gulf biota than petroleum developments.

As stated earlier, it is important to synthesize the vast amount of marine environmental knowledge on hand. This can be done on a "systems" approach where the chemistry, biology, physical oceanography and so on are put together for any area. Implementation of this process is under way and was the subject of a BLM-NOAA workshop held recently in Washington. I myself was pleased to be a member of this workshop and look forward to putting these efforts to work in the field. It is important to point out the value of having the existing data in a readily retrievable form (computerized) so that it can be used for scientific review and decision making.

It is critical that governmental, academic and industry scientific people continue to work together in these efforts.

F. T. Weiss

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APPENDIX II

QUESTIONS AND ANSWERS FOR THE RECORD

Questions for the Record for Mr. Robert T. Ryan

1. Impacts of NWS Cutbacks

   You assert that cutbacks in observational and operational networks of the NWS will result in cuts in service and possible degradation in accuracy and timeliness of forecasts and warnings.

   A. Can you please elaborate on the value of the local weather forecaster in improving the timeliness of tornado and flood warnings?

   B. Can you give specific examples of how the accuracy of forecasts and warnings has been degraded as a result of the closing of weather stations or the curtailment of their hours of operation?

2. Short-range weather forecasts

   You state that a weak area of weather forecasting is in the short range -- 30 minutes to 4 hours -- and your note that new tools, such as doppler radar, offer some promise of improvement in these forecasts.

   A. Do you feel that the Federal Government is moving quickly enough in developing and installation of adequate tools, such as Dopper radar, to deal with the problem of short-range forecasts? If not, what recommendations do you have?

   B. Do you envision an increase in use of doppler radar sets by private TV stations (such as the one in Minneapolis you cite on p. 7), and, if so, do you see any problems of conflict between forecasts and warnings issued by these stations and those provided by the NWS? How would you resolve these conflicts? Should the use of such information by TV stations be regulated?

3. Specialized Weather Services

   You have cited the value of certain specialized weather services now provided by the NWS and recommended preserving these services, while you feel that other specialized services might well be supported by the private sector.

   A. Would you support continued public provision of all specialized weather services now provided by NWS if there were no budget constraints, or do you feel that some weather services clearly belong to the private sector, i.e., fruit frost advisories.

4. User fees for weather services

   You oppose the imposition of user charges for any public forecast issued by the NWS or any NWS forecast product used by non-government meteorologists in making public forecasts.

A. Can you support, with data from analogous kinds of fees charged for services, that newspaper, radio, and TV stations would probably decide to use less weather information if they were required to pay a fee for weather forecasts and data they receive?

B. How can you justify your differentiation between private meteorological companies, who, you say on p. 12, might be charged some user fee for data and products they now receive free of charge, and the media, who, you say on p. 11, ought not to be charged for this information?

5. Licensing of Private Meteorologists

You recommend, on p. 9 of your testimony the licensing of meteorologists, especially those who issue forecasts which directly impact the public.

A. Why do you feel that the Certified Consulting Meteorological program and the AMS Radio and TV Seal program are not adequate to insure competence?

B. What kind of public licensing program should be established? Should it be operated at the State or Federal level, and whomshould be licensed?

ROBERT T. RYAN

ANSWERS TO QUESTIONS SUBMITTED

BY

SUBCOMMITTEE ON NATURAL RESOURCES,
AGRICULTURE RESEARCH AND ENVIRONMENT
U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY

1. A. The present procedure for issuing tornado and flash-flood warnings depends, to a large extent, on networks of trained volunteer observors who radio their reports to the local forecast office. It seems to me that closing local offices and lengthening the lines of communications between the observors and the forecaster could only increase rather than decrease the response time between a tornado sighting and the warning being issued for a specific town or area. Flash floods are also fast moving meteorological events and a local forecaster who has an intimate knowledge of the streams, rivers and drainage areas in his region, it seems to me, can respond much faster to a life threatening weather event than a meteorologist 100 miles away.

1. B. I can not give any specific examples of forecast degradation due to station closings; to my knowledge no such studies have been undertaken. Such a study would be very hard if not impossible to quantify. How does one prove that one specific forecast would have been more accurate or timely if one or two weather stations were not closed. We have no way of knowing what the forecast would have been or how it might have been different had the weather station been open.

I can speak from personal experience that finding the exact location and direction of winter storms off the southern New England coast is more difficult during nightime hours when the weather station on Nantucket Island is closed. A difference in storm location and track of only 50 miles can mean the difference of one inch of rain or 10 inches of snow to Boston. Several years ago the weather station ship "Hotel" was scheduled for removal. Fortunately that decision was reversed and I am confident that most meteorologists would agree the data from weather station "Hotel" have proved to be of great benefit during the years it has continued on station.

2. A. I do not feel the government is moving quickly enough with the design and implementation of a network of doppler radars. Even with the current state-of-the-art in doppler radar technology, the development of some tornadoes, especially the massive "killer tornadoes" can be "seen" in the parent cloud 10-20 minutes before they appear below the cloud, to ground based observors. Ten years ago, doppler radars found "sheer zones" in the clouds areas where tornadoes were likely to form and recently doppler radars have even allowed meteorologists to measure tornadic wind speeds.

In my opinion the establishment of networks of doppler radars in high tornado risk areas or near population centers, at a coast of several hundred million dollars, would give a forecaster a tremendous tool and allow life saving earlier warnings in many tornado events.

2. B. I do not see any significant increase in the use of doppler radars by television stations because of the significant cost of these units, over $250,000. In most instances where TV stations have radars or doppler radars

this equipment is under the supervision of trained competent professional meteorologists who know what they are doing. I know that in most instances a good working relation has developed between the TV meteorologist and the NWS meteorologist so that, in general, conflicts have not developed. The American Meteorological Society Board of Broadcast Meteorology, which I chair, is now developing a Code of Ethics for broadcast meteorolgists which will deal with the issue of dissemination of NWS warnings and how to minimize any conflicts or multiple warnings.

I can't imagine that if a TV station is willing to undertake a significant investment in purchasing a doppler radar to better serve its viewers that the use of this more timely information should be regulated. I do think that the TV station should provide a drop of the doppler display to the local forecast office and seek ways to best coordinate warnings so as to best serve the public.

3. A. Even if there were no budget constraints, I still feel that some weather services belong in the private sector. I am also happy to see that the forecasts and forecast products provided by NWS personnel to the FAA as aviation support will now be funded by a slight fee added to the cost of airline tickets. This is a specialized segment of the economy, really not the general public, who should pay for the specialized forecasts they receive.

4. A. Given an ideal world where the radio or TV station or newspaper had unlimited resources I am sure they would pay a fee for their weather forecasts and data. Given the current state of the economy and priorities in news operations, I do not feel many small or medium sized news operations could afford to pay any sizeable fee for weather services.

The New York Daily News had to terminate the UPI news service which was costing them about $20,000 per month, because of their financial plight. This is the country's largest circulation daily newspaper and if they are forced to drop a news service to save money I hardly feel they could pay a fee for a weather forecast, especially if the forecast was four to six hours old by the time the paper was distributed. In any news operation the news and news gathering are the number one priority and weather forecasts and data, even if free are a lower priority. If a fee is charged for weather forecasts and data, a news operation will not sacrifice news information fot weather information and the result will be the public will not be as well informed or received as timely weather information.

4. B. The media is the principal source of weather information and forecasts for the general public. The radio or TV station or newspaper does not change the public for this weather forecast, I do not see the rationale for the government imposing a fee for something which is intended for the general public and in some instances can be of life saving importance. On the other hand a specialized forecast prepared by a private company or organization is not meant to serve the general public, whose tax dollars support the gathering of all necessary weather data, and imposition of a fee

4. A. While the government sustains the cost of providing weather forecasts and data (paid for by the taxpaying public), it does not posses the means of disseminating this important information to the end user, the general public. Unless this information is made available to the public, it largely loses its usefulness without benefit to the taxpayer. The government must, therefore, rely on private institutions - radio, television and newspapers - to carry this information to the public. In effect, this information is disseminated to the general public without a direct change to the government or the public who receives the information. The end result is that both segments sustain their share of the costs of the information package without changing each other. As the media provide the means of dissemination without change to the public, the government should continue to provide basic weather forecasts and data to the media without change.

The impact of fees for weather information would fall disproportionally more heavily on those smaller stations or newspapers whose viewers or subscribers have no less need for the information than those who are served by larger media outlets that may be better able to pay a fee for these services.

structure seems quite proper. Is the end user of the weather information the general public or some private company or organization? If the end user of the information is public--no fee. If the end user is private--a fee. I see no problem with the differentiation.

5. A. I do not necessarily recommend licensing of meteorologists but rather feel it may be time to consider some form of licensing. The AMS CCM and Radio-TV Seal programs are indeed meant to indicate competency and are excellent vehicles to do that. However there is nothing to prevent anyone from calling himself a meteorologist, obtaining meteorological data and broadcasting his "forecast". Thus there are many people acting like meteorologists who have no training and are incompetent. The AMS programs do indeed ensure competence, but there is nothing to ensure that a company, which disseminates important weather information, forecasts and data to the public will not hire an incompetent.

5. B. If any form of licensing of meteorologists is undertaken I think it would best be done on the state level. A state licensing board could work closely with the professional organizations, as is now done in the engineering sciences for example, to establish certain minimum standards of training education and experience, to be a "licensed professional meteorologist."

April 9. 1982

ANSWERS TO QUESTIONS POSED BY THE HOUSE SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT

(Prepared by Dr. George S. Benton, as addendum to testimony of 2/23/82)

I. Value of Satellites

What specific values are derived from flying a two-satellite polar orbiting system rather than a one-satellite system? How much have satellites improved weather forecasting?

Answer:

A two-satellite system is useful. Such a system provides observations of weather over the entire globe at six-hour intervals. This gives important information concerning rapidly developing weather systems -- especially over the oceans near the United States, where adequate weather observations from ocean-based stations are often lacking.

However, it must be emphasized again (as noted in my full testimony) that the essential advantage of the two-satellite system is that it provides the in-orbit back-up which is needed to guarantee that one operating satellite will be in orbit at all times. No other method exists which can ensure the continuity of satellite operations.

It is difficult to quantify the improvements to weather forecasting that have resulted from satellite observations. However, we know that the accuracy of forecasts prepared two to five days in advance have increased dramatically in the last decade. Such improvements would not be possible without the data from satellites, which (in addition to other valuable information) provide winds and temperature measurements over oceanic and polar regions where other data do not exist.

II. Satellite Policy (Military vs Civilian)

In 1972 and again in 1978, studies were made of the civilian and military satellite systems. In both cases, it was concluded that the two systems should remain independent. In this period of strong budgetary constraints, should we again look as the policy of operating two independent meteorological satellite systems?

Answer:

I do not advocate another evaluation at this time. The 1978 study (in which I was personally involved as the representative of NOAA) led to a Presidential decision to keep the two systems separate. There are many cogent reasons for this separation which are as valid today as they were three years ago.

III. Local Weather Station Closings

It seems that every year the Administration proposes closing local weather stations.

a. How important are these small stations in providing services to the public?

b. Would the Weather Service be effective with only one office in each State, which is where we seem to be heading?

Answer:

The National Weather Service provides three essential services: (1) it maintains an observational network; (2) it analyzes the collected data; and (3) it disseminates the analyzed information to the user community, including the public.

Some of the small, part-time stations proposed for closing provide only the third function; others take observations as well. From the point of view of maintaining the efficiency of the total weather system, the most expendable stations are (in most cases) those which only have responsibility to disseminate weather information; however, from the point of view of the local communities being served, the small weather station provides an important (some would say "essential") function. Furthermore, it must be emphasized that a substantial majority of the 45 stations proposed for closing have observational as well as dissemination responsibilities.

The Weather Service as we now know it could not function with only one office in each State. Today, surface weather conditions are observed and reported at about 1,000 land stations, about 280 of which are manned by NWS personnel. Other stations are manned by the FAA, the DOD, or by private companies in cooperation with the NWS. Without weather information of this density, it would be impossible to observe many weather phenomena with sufficient accuracy.

The weather system can be streamlined. Improved automated observing stations are being developed. The observational system of the future can be designed to rely more heavily on satellite measurements, radar observations, and automatic ground stations — and less on government personnel. To achieve this objective, satellite and other automatic data acquisition systems must be strengthened. A plan must also be prepared to provide adequate dissemination of weather information using not only NOAA Weather Radio, but other modern systems such as Cable TV as well. This will be an evolutionary process.

IV. COMSAT Proposal

What is your view of the COMSAT proposal to operate the government's meteorological and land remote sensing satellites?

Answer:

The possibility of having a Federally chartered corporation provide all of the civil weather services of this country must be considered. This is a complex question -- about which I have strong opinions. However, a careful analysis of the issues would take much more space and time than is available here.

V. Weather Education

In your view, does NOAA do enough to educate the public, particularly business, to the value of weather information?

Answer:

It would be very useful if more were done by NOAA to make the public aware of the importance of weather information. A creditable job has been done in limited areas -- such as alerting the public to the nature and significance of severe weather forecasts and warnings. The program has always been handicapped by limited funds and personnel. It can be argued that in an era of tight funding, highest priority should be given to making the basic observing, analysis, forecasting, and information dissemination system function as effectively and efficiently as possible.

In my opinion, the function of educating business to the value of weather information should be left to private consulting meteorologists. This element of the private sector has grown rapidly in the last decade. They are agressive in selling themselves to industry, and can "follow through" to provide special services to a specific corporation in ways inappropriate for a government agency.

VI. Federal vs non-Federal Roles in Provision of Weather Services

You stated in your testimony that the meteorological community is close to a consensus on the appropriate roles of the Federal government, local governments, and the private sector with regard to weather services.

a. To what extent is there such a consensus among meteorologists and what are the areas of disagreement?

b. What are the positions of non-meteorologists on the proper roles of these groups? Do you feel that there is a consensus among user groups?

Answer:

The substantial majority of meteorologists have little disagreement about the appropriate roles of the Federal government and the private sector with regard to weather services.

There is much less of a consensus within the user community. Many in the user community have not thought carefully about the issues; others are more concerned about obtaining specific services -- and in making certain that these services are provided at minimum cost to them.

Obtaining a consensus which includes the various users will be more difficult, but not impossible.

VII. Alternatives to Continued Degradation of Weather Services

You make the assertion that we must not gut the effectiveness of the Weather Service by a series of ad hoc decisions designed solely to reduce spending.

a. In your opinion, what will be the result of the continued reduction in expenditueres without a plan such as you suggest?

b. Can you outline the kind of reconstructed Weather Service that should be considered in lieu of the current "gutting" of the Service by a series of ad hoc spending reductions?

Answer:

The National Weather Service can be designed to function at several different levels of expenditure -- each related to the effectiveness and value of the services provided. It is a fundamental question of public policy to decide the appropriate level of expenditure of public funds for weather services -- and the related quality of service which is needed.

At any level of expenditure, an efficient National Weather Service will exist only if senior managers understand what is expected of them: know what plans are realistic and what plans are not, in terms of funding constraints. Fashioning such an efficient organization -- especially one in a field involving technologically complex systems -- requires intelligent, long-term planning. Ad hoc reductions, made solely to reduce the budget quickly, will inevitably introduce inefficiencies.

In my opinion, this country requires a sophisticated, effective National Weather Service. Damages related to weather events reach the staggering level of about $20 billion per year; the budget of the National Weather Service is roughly one percent of this level. There is substantial reason to believe that an improved weather service will be cost effective.

It is a policy issue to determine whether all or only part of the total cost of an improved weather service should be funded by Federal appropriations. Some of the functions of the National Weather Service -- such as providing the public with warnings of hurricanes or other severe storms -- are obviously, in my opinion, a Federal responsibility, and support for these services should be included in the appropriated budget. Other services -- such as providing weather forecasts to aviation, or even certain kinds of specialized forecasts to the public -- should perhaps be performed on a user fee basis. There exist a number of ways in which the total support of weather services can be structured.

Finally -- as has been stressed in my full testimony -- the National Weather Service must move in the direction of providing improved short-term, stormscale weather forecasts. Such forecasts are technically feasible as well as economically important. Developing improved short-term forecast capabilities will require changes in our systems for observing, analyzing, and disseminating weather information. The National Weather Service should be asked to prepare a plan to bring about these changes.

VIII. Space Shuttle Launching/Costs and Benefits

You note in your testimony a way to effect substantial savings in the weather satellite program without damaging its fundamental character. Such savings could be achieved, you feel, by reversing the Executive Branch decision that weather satellites must be launched by the Shuttle when it becomes available.

a. Could you please elaborate on the Executive Branch directive that requires launch of weather satellites by the Shuttle?

b. What would you estimate are the savings which could be achieved by continued launching of weather satellites by an expendable vehicle rather than adapting the satellites for Shuttle launch?

Answer:

It is my understanding that the Office for Management and Budget has instructed NOAA/NESS to prepare out-year budget expenditures based on Shuttle launch of all weather satellites, to begin as soon as the Shuttle becomes available. I know personally that this policy was in effect for the FY82 budget. I am confident the policy has not been changed, since the Administration's FY83 budget includes funds to reconfigure the polar orbiter for Shuttle launch.

The cost of a Shuttle launch has been escalating rapidly. It is my understanding that the cost of a launch in 1985 will be about $80 million. At a comparable time, cost of a launch by an expendable vehicle (Atlas or Delta) would be about $35 million. Assuming the weather satellite is the only payload carried and that there is one launch per year (the frequency for a two-satellite program), the saving would be about $45 million per year. To this must be added the cost of reconfiguring the polar orbiter for Shuttle launch — which should result in a one-time, non-recurring expenditure of about $40 to $50 million.

Two comments must be made. First, if a decision were made to continue to use an expendable launch vehicle, the saving noted above would not reduce the FY83 budget -- since Shuttle launches are not planned until NOAA "H". For a two-satellite polar orbiting system, the only reduction in appropriations prior to NOAA "H" would be $40 to $50 million — resulting from the fact that reconfiguration of the polar orbiter would no longer be needed. This would be less than the reductions proposed by the Administration in going to the 18-month launch schedule (the so-called "one satellite" system). On the other hand, the longer-term savings would be more substantial and the system would be far more effective.

Second, savings could be made on the Shuttle launch if the weather satellite were only part of the total pay load. But for this to be a possibility, each weather satellite launch would have to be scheduled far in advance. I assume this is why the Administration has called for an inflexible 18-month launch schedule, and has eliminated the possibility of calling up a polar orbiter when the satellites in orbit fail. The effectiveness of the polar orbiting system is substantially impacted by this decision.

As I noted in my full testimony, the decision to launch small scientific satellites by Shuttle affects our national space program in many ways. From the point of view of the meteorologist interested in an effective weather satellite program, however, the decision must be viewed as an expensive one -- which also reduces program flexibility.

QUESTIONS TO DR. PAUL MAUGHAN ON EARTHSTAR TESTIMONY

1. At page 5 of your testimony, you state COMSAT is prepared to offer a "fair price" for the existing satellites and facilities. What would you consider to be adequate compensation?

ANSWER: The calculation of a fair price for the existing satellites and facilities should be based on a detailed analysis of their useful life, operational status, commercial utility, earning potential, the length and amount of a government contract and other factors. Of course, not all of this information is presently available to us. Nevertheless, in order to make an estimate of the cost to the Government of procuring data and services, we have assigned a price, for planning purposes, of $300 million for all space and ground facilities for the GOES, NOAA and LANDSAT systems. This price is, of course, subject to negotiation and may need to be revised after a detailed audit of the system.

2. In many respects the weather satellites provide backup support for our military satellite system. What are the security implications of the proposed COMSAT takeover? Have you discussed this issue with the Defense Department?

ANSWER: The security implications of a transfer of the weather satellites by COMSAT have been carefully examined. Any arrangements for a transfer of the weather satellites must provide for the President to retain the ability to take any necessary actions required for national security. For example, the President must be able to direct the data collection activities during national emergencies. We believe that the necessary arrangements can be established between the Government and COMSAT, and have discussed them with the Department of Defense and other appropriate intelligence and national security organizations. As a result of these discussions, we believe that there are no issues of national security which would preclude a transfer to COMSAT.

QUESTIONS TO DR. PAUL MAUGHAN ON EARTHSTAR TESTIMONY
PAGE - 2

3. Among other purposes, the LANDSAT program was intended to provide environmental monitoring data. I understand that your proposal has a similar intention with the implicit caviat that the information be commercially exploitable. Is there any assurance that the remote sensing system you devise will enable us to monitor non-financially renumerative environmental matters such as long range transport of pollutants?

ANSWER: We plan to replace the LANDSAT D and D Prime satellites at the end of their useful lives with more economical and technologically advanced satellites and sensors which will meet the needs of the Government and commercial users. The monitoring of the environment will be, we anticipate, a requirement of the Government which would need to be met by the EARTHSTAR system. The extent to which these requirements require unique sensors or equipment will require decisions by the Government regarding the value of the data in comparison to the cost of the data.

4. What is the status of your discussions with the Administration on your proposal?

ANSWER: We have been in close touch with the Administration on the EARTHSTAR initiative. We understand that the Administration is giving our proposal serious consideration and expect a policy decision in the near future.

QUESTIONS FOR MR. BOBBY F. McKOWN

1. You argue that private industry would be incapable of providing the same quality of service to the growers that the National Weather Service currently provides.

   a. Do you think that over time the private sector would adapt and learn to be as effective as the National Weather Service in providing fruit frost advisories?

No, I do not believe that the private sector can or would ever reach the degree of effectiveness of the National Weather Service in providing fruit frost advisories. First, they do not have the equipment nor the capital to maintain and utilize satellite, micro stations, etc. Most of the private sector services depend upon facilities like Ruskin for raw data and feeder systems for their evaluation and forecasts.

Florida Citrus Mutual also believes that if a firm had all of the agricultural frost service business, the total fees would not provide economic stability for long term involvement and business continuity. There would be many services, fragmented and less than capable of providing detailed accurate narrative frost service data. A big, big problem is how to communicate accurate data to growers in a timely manner! The private sector cannot where the U.S. government can.

   b. What are the possibilities that the growers might be able to subsidize the operation of the Ruskin station?

There are possibilities that citrus growers could subsidize the Ruskin operation; however, we do not have statutory taxing authority. Cattle, vegetables, ornamentals, nurseries, foliage operators, etc. would have the benefit of the service and we do not know of any viable economical means to collect equitable fees. The collection system would possibly be more expensive than the service. Florida citrus growers already pay for the service in federal taxes and in fact this is one of the very few services available to our members. We are not subsidized nor price supported.

2. How large are the cost savings, state-wide, from the fruit frost services currently provided by the Ruskin station?

We sustained a 25% loss in our citrus crop during January 11 - 12, 1982, and if the frost service had not been available then we could have sustained up to possibly a 50% loss.

A recent Florida Citrus Energy Survey indicated that approximately 425 gallons of diesel fuel (or its equivalent) is required per acre in the production of citrus on the lower ridge in Central Florida. Growers interviewed estimate that 318 gallons of diesel per acre was used on frost protection.[1/] The frost warning service alerts growers of unscheduled meteorological changes such as cloud cover, wind drift or dewpoints. Each hour's delay of firing heaters on an estimated 3,670 acres would conserve approximately 128,000 gallons of diesel fuel (valued at over $122,000). Each hour's delay of starting wind machines which protect an estimated 3,330 acres would consume 1,665 gallons of gasoline (valued at $1,831). The combined savings amounts to about 130,000 gallons of fuel or 18 billion BTU's conserved for each hour's delay.

At this rate over one half million gallons of fuel could be conserved if a one-hour delay could be achieved on only four nights during the winter.

This represents for the four-hour delay a potential conservation of over 70 billion BTU's.

The assumed cost/benefit ratio in Polk County where approximately 7,000 acres are protected by heaters and/or wind machines is projected at 1:17 for every hour's delay of frost protection. This does not include the savings in the logistics assocated with firing such as transportation costs of moving firing crews into the field nor the labor and equipment to refuel grove heaters and wind machines.

Please note these data are only for one county and we have 31 other citrus producing counties, thereby substantially escalating the savings accruing to growers and cost of food to consumers.

3. Have you been in contact with fruit growers in other areas of the country, such as California, Texas, and Washington? What are their plans for obtaining fruit frost services in the future?

Yes, Florida Citrus Mutual has been in contact with fruit growers and organizations in the states of California, Arizona and Texas. All of us researched the possibilities of alternatives in the event the national frost warning service should be discontinued, and in the early stages we all were optimistic that possibly the private sector could be utilized on a sound basis. However, after full review, California, Arizona, Texas and Florida jointly concurred that the national frost warning service is the most efficient and viable delivery system available.

[1/] Figures based on 3.7 nights of cold protection of six hours duration.

It is my understanding that the other states would find themselves pretty much in the same situation that Florida faces; i.e., a fragmented weather service, lack of competence to provide detailed accurate data in a timely manner for growers use. Furthermore, the private sector systems would not be available to small growers because of cost.

4. Granted that the citrus industry in Florida is an enormous enterprise, why should it receive preferential treatment from the government in relation to growers of other crops? Or do you feel that growers of other crops already receive specialized services?

Yes, the Florida citrus industry is a substantial contributor to the economy of the State of Florida. We do not believe that the continuation of the national frost warning service can be nor should be considered as preferential treatment from our government to citrus growers. In fact, the frost warning service is utilized by almost every agricultural segment in Florida. Through this service we are able to protect our crops, thereby reducing the cost of food to the American consumer.

In addition, by protecting the crop, we are able to keep far more people employed; thereby they are able to pay federal income taxes and contribute to the gross national product of our economy. We also believe that the government frost warning service is the only available unbiased service of accurate data.

The Florida citrus industry is not subsidized nor price supported and there are many other segments of our society who currently receive expensive specialized services.

McK:vb
4/1/82

AOPA
AIRCRAFT
OWNERS
AND
PILOTS
ASSOCIATION

April 7, 1982

Rep. James H. Scheuer, Chairman
Subcommittee on Natural Resources,
  Agriculture Research and Environment
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

This responds to questions presented in your letter of March 28, 1982, concerning our testimony before your Committee on February 23, 1982.

Since each question required a response of various lengths, I have enclosed them as separate attachments to this letter.

Also enclosed is the corrected copy of the testimony manuscript.

We appreciated the opportunity to discuss the impacts of the proposed National Weather Service budget cuts with the Committee.

Sincerely,

Thomas L. Oneto

Thomas L. Oneto, Planning Officer
Technical Policy and Plans

Attachments

7315 Wisconsin Avenue (Air Rights Building) / Washington, D.C. 20014 / Telephone: (301) 654-0500 / Telex: 89-8468 / Cable Address: AOPA, Washington, D.C.
Member: International Council of Aircraft Owner and Pilot Associations
When writing ALWAYS use your AOPA number.

Question 1 - "...you indicate that your organization is opposed to the closing of those stations located where there is no alternate source of weather observations. Could you identify those locations for the Subcommittee?"

AOPA has compiled two lists for identifying locations experiencing a loss of weather observations, either permanently or during certain hours of the day, as a result of proposed budget cuts.

The first list contains those 20 part-time locations to be closed and what, if any, alternate sources of observations would be available after closure. This listing discloses that following the station closings, three locations will have no observations available. When part-time towers or FAA Flight Service Stations (FSS) are closed, 5 locations will have no observations. Following is a listing of those locations:

Complete loss of observations if stations closed.

Alamosa, CO
Havre, MT
Unalakleet, AK

Loss of observations when part-time FSS/tower closed.

Pueblo, CO
DuBuque, IA
Flagstaff, AZ
Santa Maria, CA
Lewiston, ID

Referring to the second list of 25 full-time stations scheduled for closing, it is apparent that there is a greater number of observation alternatives available. Considering the number of major hub airports listed, this is understandable. However, further examination discloses that two of these locations will lose observations upon station closure, and nine locations will lose observations when the part-time FSS/tower is closed. Following is a listing of those locations:

Complete loss of observation if station closed.

Tupelo, MS
Kalispell, MT

Loss of observation when part-time FSS/towers are closed.

Bridgeport, CT
Rochester, NY
Allentown, PA
Flint, MI
Grand Rapids, MI
Chattanooga, TN
Port Arthur, TX
Olympia, WA
Long Beach, CA

20 Part-time Weather Service Office Closings

	Station	Hours of Operation	On/Off Airport	FSS		Tower
1.	Mansfield, OH	12 hrs/day 7 days/wk	On	No	Yes	24 hours
2.	Williamsport, PA	16 hrs/day 7 days/wk	On	Yes	Yes	1100-0500Z
3.	Elkins, WV	15 hrs/day 7 days/wk	On	Yes	No	
4.	Alamosa, CO	12 hrs/day 7 days/wk	Off	No	No	
5.	Pueblo, CO	16 hrs/day 7 days/wk	Off	No	Yes	1300-0600Z
6.	DuBuque, IA	12 hrs/day 7 days/wk	On	No	Yes	1300-0500Z
7.	Aberdeen, SD	16 hrs/day 7 days/wk	On	Yes	No	
8.	LaCrosse, WI	15 hrs/day 5 days/wk	Off	Yes	Yes	1200-0400Z
9.	Flagstaff, AZ	16 hrs/day 7 days/wk	Unavailable	No	Yes	1400-0200Z
10.	Bakersfield, CA	16 hrs/day 7 days/wk	On	Yes	Yes	1400-0700Z
11.	Red Bluff, CA	16 hrs/day 7 days/wk	On	Yes	No	
12.	Santa Maria, CA	16 hrs/day 7 days/wk	On	No	Yes	1430-0400Z
13.	Lewiston, ID	16 hrs/day 7 days/wk	Off	No	Yes	1400-0600Z
14.	Havre, MT	16 hrs/day 7 days/wk	Unavailable	No	No	
15.	Elko, NV	8 hrs/day 5 days/wk	Off	Yes	No	
16.	Walla Walla, WA	8 hrs/day 7 days/wk	Off	Yes	Yes	1500-0500Z

20 Part-time Weather Service Office Closings (Cont'd)

	Station	Hours of Operation	On/Off Airport	FSS		Tower
17.	Sheridan, WY	15 hrs/day 5 days/wk	On	Yes	No	
18.	Unalakleet, AK	8 hrs/day 5 days/wk	Unavailable	No	No	
19.	Homer, AK	8 hrs/day 5 days/wk	On	Yes	No	
20.	Kahului, HI	12 hrs/day 7 days/wk	Unavailable	No	Yes	24 hours

- end -

Full-time Weather Service Office Closings

	Station	Hours of Operation	On/Off Airport	FSS		Tower
1.	Bridgeport, CT	24	On	No	Yes	1200-0400Z
2.	New York-LaGuardia	24	On	No	Yes	24 hours
3.	New York - Kennedy	24	On	No	Yes	24 hours
4.	Rochester, NY	24	On	No	Yes	1100-0500Z
5.	Newark, NJ	24	On	No	Yes	24 hours
6.	Tallahassee, FL	24	On	Yes	Yes	1100-0500Z
7.	Washington-Dulles	24	On	No	Yes	24 hours
8.	Allentown, PA	24	On	No	Yes	1130-0400Z
9.	Youngstown, OH	24	On	Yes	Yes	24 hours
10.	South Bend, IN	24	On	Yes	Yes	24 hours
11.	Flint, MI	24	On	No	Yes	1200-0400Z
12.	Lansing, MI	24	Off	Yes	Yes	1130-0430Z
13.	Grand Rapids, MI	24	Off	No	Yes	1100-0500Z
14.	Rockford, IL	24	On	Yes	Yes	24 hours
15.	Chicago (ORD) IL	24	On	No	Yes	24 hours
16.	Chattanooga, TN	24	On	No	Yes	1100-0400Z
17.	Tupelo, MS	New Station Canceled				
18.	Port Arthur, TX	24	On	No	Yes	1200-0200Z
19.	Springfield, MO	24	Off	Yes	Yes	1200-0500Z
20.	Lincoln, NE	24	Off	Yes	Yes	1300-0200Z
21.	Kalispell, MT	24	Off	No	No	
22.	Olympia, WA	24	On	No	Yes	1700-0100Z
23.	San Francisco, CA	24	On	No	Yes	24 hours
24.	Long Beach, CA	24	On	No	Yes	1500-0900Z
25.	Valdez, AK	24	On	Yes	Yes	1800-0200Z

Question 2 - GAO Report critical of AFOS

a. Do you believe that the criticism is valid?

Yes, the National Weather Service (NWS) has fallen victim to a malady that affects all bureaucratic agencies involved in long-range projects: The longer a project has been in progress the greater the loss of momentum accompanied by foot-dragging and lack of enthusiasm. In addition to management practices and controls, priorities have a tendency to become as diversified as the management personnel themselves. As the players changed, so did the rules and practices.

In short, the Report was effective in prodding NWS to get the project back on track. Additionally, assigning one office with the responsibility for managing the project will assure that continuity is maintained even though the players may change.

b. Has the GAO report slowed the development of this system?

No, quite the contrary. The report placed the project back in the limelight and, if anything, accelerated its development.

c. What effect will this system have on general aviation?

It will provide access to more timely data, in addition to providing a wider dissemination of information. The existing FAA teletypewriter system is inadequate for future aviation needs. Like any new system providing data processing capabilities, there are spin-offs that, although not included in the original system design, will benefit the users. An example of this is the access by home computer, either by dedicated line or subscription through a private weather service. Another example is the avoidance of delays and inability to retrieve historical weather data on a timely basis from the FAA's present Flight Service Station network.

Question 3 - Will the closing of aviation weather stations without a concurrent increase in automated observing systems pose a severe threat to the public?

What really is being asked is, will the closings affect aviation safety, and the answer is yes. Our concern is that concurrent with the proposed closing of aviation weather stations by the NWS, the FAA is planning to reduce the number of flight service stations through its FSS modernization plan, in addition to presently closing and part-timing a number of control towers. Some of these facilities also make weather observations.

The accummulated effect of these reduced observations will be: (1) lack of real-time weather at many airports, (2) reduced data base for forecast development and accuracy, and (3) a derogation of safety resulting from items 1 and 2.

There is currently no methodology available that can predict or estimate the increase in accident potential associated with a decrease in the number of observation sites. However, historical precedent indicates that the more weather information made available to the pilot, the lower the accident potential. We can only assume an inverse effect when the opposite occurs.

Question 4 - What is your view of the Administration's proposals to:

a. Eliminate Aviation Area Forecasts?

Actually, the aviation area forecasts would be replaced by a generalized aviation forecast provided by NWS's Kansas City office. This would enable NWS to close their nine forecast offices in the conterminous United States, yet enable them to develop accurate forecasts predicated upon the same weather observations previously provided those offices.

This would not only represent a savings to the taxpayer, but would result in a more efficient data-gathering and analysis system. We support this endeavor.

b. Finance aviation weather services from the Airport Trust Fund?

No, as stated in our testimony, specialized aviation weather services were an outgrowth of a decentralization effort by NOAA's predecessor, when present communications and data processing systems were not available. Decentralization was the proper decision at that time.

We now think it is time to centralize all weather services under one agency, and that agency be funded from the general fund.

The ADAP fund was created for the development of the airport and airway system. To be used for other than the purpose for which it was intended is unacceptable.

QUESTIONS FOR DR. EDDY

1. On page 4 of your testimony, you mention several State systems such as AGNET and GREENTHUMB which supply weather information with minicomputers.

   a. Would you describe one of these systems for us in greater detail?

AGNET: A management tool for Agriculture.

Address: Jim Kendrick
105 Miller Hall
University of Nebraska
Lincoln, NE 68583

Phone: 402/472-2033

or

Pat Ebmeier 402/472-1892

AGNET (AGricultural computer NETwork), developed and led by Dr. James G. Kendrick, Professor of Ag. Economics, and Dr. Thomas L. Thompson, Professor of Ag. Engineering, University of Nebraska-Lincoln, is a unique computing network designed to be used by people with no previous knowledge of computers. After a simple logon procedure (hookup to the computer) the user types one word and acquires access to the desired computer program or package of programs.

This system assists users in making management decisions which in the past were based on little more than sophisticated guesses. It can help the users answer such questions as: What are the prospects for making a profit if I put cattle on feed now? What is the best depreciation method to use for my new combine? What is the per acre cost of surface or center pivot irrigation, and when should the water be applied? They no longer need to guess the answers to these and many other complex management questions.

Access to AGNET is through typewriter-like devices called terminals that "talk" to the central computer over any telephone. Lightweight portable terminals can be used wherever there is an electrical outlet and a phone--anywhere from a home kitchen to a sale barn.

Most of the AGNET programs are developed by teams of specialists from various fields on and off campus. They use current research findings to provide management analyses of complex agricultural problems. The AGNET system is used not only by farmers, but also by researchers, agricultural extension specialists, and students.

Individuals who have some experience with the subject matter of the program can easily use AGNET programs, because the computer leads the user through the exercise with descriptions, questions, examples, help routines and other options. When the user needs assistance they type "help" and the program explains the question or options in greater detail.

The power of all AGNET programs lies in the ability of the user to ask the "what-if" question. AGNET permits the user to explore management alternatives in each of the many programs now available on the system.

GREEN THUMB

Address: Tom Priddy
Ag. Engineering Department
University of Kentucky
Lexington, KY 40546

Phone: 606/258-5850

Program/Audiences:

The Green Thumb Test Project is a computer based method of disseminating information. For this test the information will be geared to agricultural production. A state computer will have continuous input from the National Weather Service and the Chicago Board of Trade/Mercantile Exchange. Extension recommendations and advisories will be entered into the system by extension specialists. All the information will be geared to the local county situation. The state computer will update a computer located in the county agent's office every hour (24 hours per day, 7 days a week). The farmer will have access to the information at the county level through use of a "Green Thumb Box" which attaches to the farmer's existing television and plugs into his telephone line. To have access to the system, the farmer would select items of information from a list (menu) provided to him. After pushing the appropriate item number on his "Green Thumb Box" (the numbers would display on his TV), he would dial a special number to his county agent's office automatically connecting him to his county computer. The information he requested would then be loaded into a memory clip in his "Green Thumb Box" at high speed. At this point, the telephone line would automatically be disconnected and be ready for another caller. The information, however, would be stored in the farmer's "Green Thumb Box" to be displayed on the television at the farmer's convenience. One of the important elements in this test is a comprehensive extension program to teach farmers to better utilize the weather and other information made available to them for decision making.

Expected Results

This dissemination system represents a major departure from the past by providing weather information, marketing information, extension recommendations and advisories directly to the farmer in a timely manner. The Agricultural Research Institute found that for every $1 invested into the improvement of weather information there is a return of $50 to U.S. agricultural production. This project is expected to significantly reduce the uncertainty in farm production and marketing for the individual farmer.

b. Do these users receive their data directly from a National Weather Service Office, or are they provided by a private company?

GREEN THUMB gets information directly from the N.W.S. AGNET is a planning tool.

2. On page 5, you state that NOAA is beginning to put "improvements in public service ahead of its own image enhancement."

a. In what ways has the Weather Service not been responsive to public needs in the past? Please give examples.

i) In July 1980 I documented a need by 19 users around Oklahoma for digital radar information. The information was available but the N.W.S. would not allow its use in any effective manner by these critically interested users. The N.W.S. has now changed some of its administration, and hence its policies for the better and this particular problem has begun to be resolved.

ii) The N.W.S. refused to give me, the Oklahoma State Climatologist, the names and addresses of the COOPERATIVE observers in my State. They said they "could not give this information out to just anybody." This was eventually resolved.

b. You state on page 6 that some of NOAA's priorities "are out of order and some of its commitments should be changed." Which ones?

Although this country has problems with producing enough energy, water and food; and in spite of the fact that a great deal of data, information and technical capability are available in the area of climatology and meteorology to help alleviate these problems to a significant extent; NOAA continues to put vast sums of money into theoretical studies and into improving (by a very small amount) its Numerical Prediction models INSTEAD OF encouraging application oriented endeavors and critical user services.

3. On page 6, you propose that NOAA spend 90% of its research effort educating the public on the value of timely weather and climate information.

   a. In what specific economic sectors do you feel that weather and climate data are being underutilized?

   Weather and climate data are being underutilized in

   i) water management

ii) utility planning, operations, and rate setting

iii) transportation

iv) construction

v) urban planning

vi) agriculture

vii) etc.

b. What evidence can you give us that enhanced use of weather and climate data would indeed enhance GNP?

This is a complicated question; however, our ECONOMIC IMPACT CONSORTIUM (comprising the Oklahoma Climatological Survey at O.U., the University of Missouri at Columbia, and the University of Nebraska at Lincoln) at the present time is in the process of publishing a report on U.S.D.A. policies which will answer this question directly in the case of a portion of the food producing sector. We will also publish a brochure this fall giving a selection of examples drawn from several sectors to answer this question. We can mail these to you when they are ready if you wish.

4. NOAA's FY 1983 budget contains several proposals which would affect the operations of the National Weather Service. What is your view of:

a. Proposed closure of 45 local Weather Service Offices across the country?

This will probably bring about a short term loss to the economy; however, as the private sector takes over the services, such losses will disappear and a long term gain can be expected.

b. Elimination of agricultural weather services?

This is a very bad proposal. Even though the private sector will likely take up some of the slack, the dispersed nature of the user group will make for an economic loss for the next decade or more.

c. The proposal to transfer funding of aviation weather services to the FAA Airport Trust Fund?

I have no competence to reply to this question.

odsi OCEAN DATA SYSTEMS, INC.
2400 GARDEN ROAD, MONTEREY, CALIFORNIA 93940 • 408/649-1133

April 6, 1982

Dr. Bob Palmer
Staff, Subcommittee on Natural Resources,
Agriculture Research and Environment
Room 820, House Office Building Annex #1
US House of Representatives
Washington, D.C. 20515

Dear Dr. Palmer:

I have corrected my transcript and it is returned herein.

Responses to your questions follow.

1A. Would you please clarify your position on whether the Federal Government should ever provide any specialized services, even in times when there are not budgetary restraints? During periods of relaxed budgetary restraints the National Weather Services, if not fettered, quite naturally expands its activities into the specialized services. Then when budgetary squeezes occur, there is opposition to reduction in the specialized services. This leads to a tendancy to cut observations and basic service elements -- precisely what has been occurring over the recent past. My answer, therefore, is that the National Weather Service should only expand basic services and those elements which support basic services and enable the private sector meteorological community to best support the specialized service requirements.

1B. If the Federal Government does have a role in specialized services, which services are appropriate for NWS and which ones are solely a private sector responsibility? See my answer to 1A.

1C. You appear to stress that civil marine weather services ought not to be provided by the Government. Can you defend your stance on this particular specialized service? Do you believe that this view reflects the position of those who use marine weather services? Marine weather services can be placed in the same categories as the continental services; warnings and public service forecasts (basic services). Basic services should be issued by the Government. I would point out, however, that this function is already carried out by the U.S. Navy except for the U.S. coastal and inland waters. It is probably most cost efficient to ensure that U.S. Navy weather information be made available to civil marine interests rather than encourage the NWS to duplicate the Navy efforts. Specialized marine weather services, such as forecasts for individual ship operations, are presently being provided by my company and others. We are able to successfully sell our services. We could provide this "value added" service at a lower price if we could obtain, at no additional cost to the NWS, the output from their forecast models in computer grid-field format. It is appropriate that the NWS charge a "User Fee" for these data.

1D. Do you regard services to protect the safety of fishermen as "specialized services?" No, I consider those services to be part of "basic services." I do consider information such as the depth of the thermocline and the location of surface and subsurface temperature features—parameters used in fishing decisions--to be "specialized services."

2A. Do you feel that the general public could be taught the value of public weather services to the extent that charging for these services could ever be justified (i.e., could we charge the public for phone calls to the weather number)? Again, I would not recommend that the NWS charge for basic services (warnings and public service forecasts). I see nothing wrong, however, for the final phrase in the telephone forecast to be "for specialized weather services check the yellow pages under 'weather services'."

3A. Can you explain your assertation that reduction of polar spacecraft from 2 to 1 will not provide adequate observations? Polar orbiting satellites provide atmospheric vertical temperature profiles which are needed to determine the initial conditions necessary for forecast models. Geostationary satellites do not cover the polar areas. We need two polar orbiting satellites to provide the vertical temperature profile data at the required resolution and frequency, and provide satellite imagery (pictures) in the polar regions. One possible economical solution is to combine NOAA and DOD assets with NOAA assuming budgetary, management, and operational responsibility for the geostationary satellites and DOD assuming budgetary, management, and operational responsibility for the polar orbiters.

3B. Have you examined the specific impacts on the data observation net of closing the 45 stations selected for closure? I do not have a list of the 45 stations targeted for closure so I can't comment on this.

3C. What would be your recommended schedule and funding level for development of the NEXRAD? Restore the $1M proposed to be cut from the program.

If I can be of any further service let me hear from you.

Sincerely,

OCEAN DATA SYSTEMS, INC.

CRWard

C. R. Ward
Vice President

CRW/ko5

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

DIVISION OF
FISH, GAME AND WILDLIFE
RUSSELL A. COOKINGHAM
DIRECTOR

PLEASE REPLY TO:
P. O. BOX 1809
TRENTON, NEW JERSEY 08625

April 5, 1982

Dr. Robert Palmer
Subcommittee NRARE
820 House Office Building
Annex #1
Washington, D.C. 20515

Dear Dr. Palmer:

Enclosed is my marked up testimony that was given before the House Subcommittee on February 25, 1982. In answer to your questions:

1. I do not agree at all with the NOAA budget justification for the elimination of the Hudson Raritan Research Project in fiscal year 1983. As I pointed out in my testimony, the research certainly has not been completed, in fact, it has been looked at only in a cursory fashion. There has been no attempt to understand the longterm effects of waste disposal in the sea. The rationale which NOAA uses is certainly contrary to the facts.

2. In answer to your second question, EPA has been supplied with the cost of dumping various waste products on land and at sea. In addition, they have been supplied with information on the chemical neutralization. It is therefore quite simple to determine an appropriate cost and simply charge them the difference between at sea disposal and chemical neutralization. I think this point is extremely critical because from an economic and social standpoint, society is alternately paying the price for any degradation of the environment. Unfortunately, these costs are postponed in time and usually result in a much higher cost in the future than would be required at this time.

The money could be collected by either a state or federal agency and dispersed either to the federal government or the state government to conduct the necessary research. Some of these funds should also be reserved to provide for habitat construction such as artificial reefs. In answer to Part B of your question, these mitigating funds could in many instances completely replace the federal research funds now supplied, especially along the East Coast of the United States. I cannot comment on a nationwide basis because I am not familiar with the West Coast situation. If you have any further questions, please feel free to give me a call.

Sincerely yours,

Bruce L. Freeman
am

Bruce L. Freeman
Marine Fisheries Administrator

Questions for Mr. Kamlet

1. Ecological Health of the Oceans

Since 1970, the Congress has enacted several laws in an attempt to improve the environmental quality of the oceans (Ocean Dumping Act, Clean Water Act -- to name just two).

a. Have these laws made an impact upon the ecological health of the oceans?

b. Has the ability of our coastal waters to support renewable fisheries and good recreational opportunities increased or decreased over the last decade?

c. What are the most significant threats to the health of the oceans posed by man's activities over the next decade?

-- increased offshore oil exploration?

-- sewage?

-- runoff from land?

-- others?

2. Detoxifying (Self-cleaning) mechanisms

Mr. Bascom indicated in his testimony that heavy metals and certain toxic organic compounds may not be a threat to marine animals, since many of these organisms possess the ability to "detoxify" these chemicals.

Do you agree with this hypothesis?

3. PCBs in the Food Chain

In a 1979 NOAA study, concentrations of PCBs were measured in fish and shellfish collected from Long Island Sound. Concentrations averaged 3 to 4 parts per million (ppm) of PCBs for striped bass, bluefish, eel, shad, and white perch, with values for individual fish as high as 21.5 parts per million. The FDA limit for PCBs in fish flesh is 5 parts per million; in 1979 there was consideration of lowering the action level to 2 parts per million.

a. Do these relatively high concentrations of PCBs in fish and shellfish concern you?

b. If the threat from PCBs is real, what should we do about it?

4. Harbor Dredging (coal exports)

Harbor dredging will certainly increase significantly over the next decade as this country develops its capabilities to export coal.

a. Will this increased dredging pose a threat to marine ecosystems?

b. Should be begin an aggressive research program now to anticipate this development?

c. How good are our analytical tools for predicting the impact of dredging and dredge spoil disposal?

5. Monitoring the Impacts of Waste Disposal

The members of your panel seem to differ in philosophy toward monitoring the impacts of waste disposal. Two of you seem to feel that we can monitor the impacts of waste disposal while we dispose of waste; two of you seem to feel that the threat of waste disposal is great enough and our ignorance vast enough that waste disposal should be severely limited now.

a. Please comment on the type of ocean waste disposal strategy and the type of monitoring strategy which makes sense in light of our current knowledge?

b. Who should be responsible for monitoring the impact of accelerated development of offshore oil (industry, government)?

6. State of Knowledge regarding Ocean Pollution

Mr. Kamlet, you imply that the ocean deserves special consideration regarding waste disposal, at least partly because our knowledge of ocean processes is poor. Dr. Goldberg, stated that our knowledge of pollution in the ocean is far greater than our knowledge of of pollution on land.

Which of you is right? Why?

7. Health of the New York Bight

In testimony before this Subcommittee last year, a NOAA witness stated that the New York Bight is one of the most severely degraded oceanic ecosystems in the world.

a. Do you agree with this assessment?

b. Has the capacity of the New York Bight to assimilate wastes been exceeded? For which chemicals?

8. 12-mile vs. 106-mile Dumpsite

If you could choose between dumping sewage wastes at the site 12 miles off N. Y. or the site 106 miles off N.Y., which one would you choose?

Responses to Questions for Mr. Kamlet

1. Ecological Health of the Oceans

a.) I do think that legislation enacted over the past decade to improve the ocean's environmental quality has made an impact on the ecological health of the ocean. Two examples come immediately to mind. On the east coast, the incidence of "fin-rot" disease in winter flounder inhabiting the New York Bight has declined about 16-fold (as I recall) during this period. On the west coast, DDT and PCB contamination problems in the Southern California Bight have been significantly ameliorated. Unfortunately, significant pollution problems persist in our coastal waters. The ocean dumping of dredge spoils and sewage sludges in the New York Bight continues to contribute massive quantities of PCBs, oil and grease, and other contaminants to the Bight Apex. These pollutants have been detected in the tissues of Bight fish and shellfish at levels high enough to give rise to legitimate concerns about impacts on health and the environment.

b.) There has been an overall decrease in annual yields of finfish in the Bight over the past twenty-five years. Total domestic commercial landings in the two Bight area states (New York and New Jersey) reached a peak of about 315,000 metric tons as recently as 1956, but dropped to less than 30,000 metric tons by 1975. Most of this decline was caused by the decline of the menhaden industry, based on a species not used for human food. The catch of food finfishes has been declining since 1939, but the catch of shellfishes has followed an upward trend since 1942. Although over-fishing is probably the primary cause of finfish declines in the Bight, a number of fish and shellfish species in the Bight are known to be sensitive to water pollution impacts. These include: scup or porgy; American shad (problems with PCB residues); striped bass (biological productivity may be enhanced by sewage pollution, but susceptible to chemical contamination); Atlantic croaker; surf clam; hard clam or quahog; blue crab; soft clam; Atlantic sturgeon; and swordfish (mercury contamination). NOAA researchers have documented statistically higher heavy metal contamination levels in finfish off the New York and New Jersey coasts than in less polluted waters to the south. In short, while trends in fin and shellfish productivity cannot be attributed to ocean pollution control legislation, it seems highly probable that controls on toxic chemical inputs to coastal ocean waters will have a direct bearing on the contamination status and healthfulness of seafood resources.

c.) I believe that the most significant threats to the health of the oceans over the next decade and beyond will continue to be those associated with inputs of persistent toxic chemicals. Such pollutants derive from direct ocean dumping, outfall discharges, riverine inflow, atmospheric fallout, spills and accidents, and runoff from land. All of these sources need to be controlled to the maximum possible extent.

2. Detoxifying (Self-cleaning) mechanisms

The suggestion that heavy metals and toxic organic compounds pose no threat to marine organisms because they are able to detoxify these chemicals is more wishful thinking than a basis for complacency about marine pollution impacts. With respect to polychlorinated organic compounds (e.g., PCBs and DDT), for example, while their uptake into the tissues of marine organisms may stimulate defensive reactions such as stepped up production of mixed-function oxidase enzymes by the livers of these organisms, the impact on the organism may be significant and adverse. Thus, although the foreign chemicals that induced increased secretions of detoxifying enzymes might to some extent be counteracted by these enzymes (although many chlorinated organics are largely impervious to oxidation or hydroxylation), there is considerable evidence that the high levels of these enzymes induced by the contaminants may "accidentally" break down important sex steroids critical to normal reproductive activities. These secondary reproductive effects have been observed in such fish-eating species as mink and seals (and in predatory birds such as the brown pelican, peregrine falcon, etc.).

With respect to heavy metals, it has been suspected for at least five or six years that both subcellular lysosomes and the cellular pool of "metallothionein" in marine animals may play a role in the uptake, storage and sequestration of toxic heavy metals. However, these mechanisms, rather than being effective barriers to heavy metal toxicity, serve only to define the threshold level of pollution that produces adverse biological effects. In highly polluted areas, for example, the binding capacity of metallothionein is readily exceeded, and excesses of cadmium and other metals may spill over into the enzyme-containing pool, where the function of metalloenzymes may be disrupted, thereby resulting in toxic effects to the organisms.

In any event, there is nothing about these mechanisms that is unique to the marine environment and they would apply equally on land. Indeed, improvements in the ability to sample seawater and analyze it accurately for the presence of trace metals (without introducing contaminants during the measurement process) suggest that natural concentrations of trace metals in seawater are one to several orders of magnitude less than previously believed. Consequently, pollution-related inputs to the marine environment assume a far greater relative importance than suspected prior to 1975 or so. In short, there is no reason to believe that marine organisms are less susceptible to the detrimental effects of heavy metal and organic chemical pollutants than their land-based counterparts. To the contrary, the well-developed ability of many marine organisms to bioconcentrate contaminants into their tissues from minute levels in the surrounding seawater seems to lack any obvious land-based analog (except that food-chain biomagnification may be more important on land).

3. PCBs in the Food Chain

a.) PCB levels in Long Island Sound fish and shellfish in the range of 3 to 21.5 parts per million certainly concern me because they are clearly in the range in which significant adverse impacts may be experienced by seafood-consuming humans and wildlife.

b.) All that can be done about the PCB threat is to: (a) maintain an ongoing "early warning" monitoring program of water, sediments, and organisms, to restrict the human consumption of excessively contaminated seafood; (b) dredge out PCB-contamination hot-spots of bottom sediments--e.g., along the upper Hudson River--to minimize the downstream movement of contaminated bottom sediments; (c) restrict the open water disposal of PCB-contaminated dredge spoils and sludges; and (4) ban the further use of PCB-containing capacitors and other environmental sources of this contaminant.

4. Harbor Dredging (coal exports)

a.) Increased dredging in connection with expanded coal port development will undoubtedly pose an increased threat to marine ecosystems (to the extent that much of the dredged material will be proposed for ocean dumping). However, quantitatively, the vast majority of the additional dredged material generated in this way will be "virgin" material from new work dredging (i.e., where channels and harbors are deepened to much greater than historical depths). This virgin material will be largely natural sand, silt, clay, and rock with minimal levels of exogenous pollution. In addition, however, one can anticipate a small but significant amount of dredging which will involve the removal of sediments that have accumulated in the dredged channels from upstream sources. This material will resemble maintenance-dredged material. If the upstream sources are contaminated, so will be these sediments. It is this material that will pose the greatest risks to the marine environment.

b.) Advance planning to ensure that acceptable non-ocean alternatives are available for coal project-related dredged materials which cannot legally and appropriately be ocean-dumped should certainly begin as soon as possible.

c.) Current solid-phase bioassay and bioaccumulation tests for assessing the harm potential to the marine environment of contaminated dredge spoils represent, in my view, a reasonable--albeit imperfect--approach to predicting the impact of dredge spoil disposal. While these techniques should be constantly refined and improved, they are clearly preferable to approches which scorn prediction in favor of allowing the dumping to proceed and seeking to measure consequences after-the-fact.

5. Monitoring the Impacts of Waste Disposal

a.) Any ocean waste disposal strategy should recognize that persistent toxic wastes should be isolated and contained to the extent possible, and that less toxic, biodegradable (or readily assimilable) materials should be dispersed. The ocean, as a dispersal medium, should be used only for disposal of wastes that are appropriately dispersed. The current state of the art remains largely incapable of assessing long-term and sublethal marine pollution impacts. After-the-fact monitoring can only detect with confidence massive departures from the ranges of natural variability. It, therefore, is not a prudent approach to monitor the impacts of waste disposal while we dispose of at least persistent toxic wastes. These wastes will persist and exert chronic effects whether or not we are able to follow their fate and effects.

The only type of monitoring stragegy that makes sense is one which places heavy reliance on pre-dumping predictive screening, coupled with field testing and the most sensitive available monitoring techniques.

b.) The costs of monitoring the impact of accelerated development of offshore oil should clearly be borne by the industry that engages in and profits from such development. However, the monitoring itself should be performed--or at least actively supervised--by qualified third parties (e.g., in government or in private research institutions) to minimize the problem of having the "fox" guard the "henhouse".

6. State of Knowledge regarding Ocean Pollution

I would dispute the contention that our knowledge of pollution in the ocean is far greater than our knowledge of pollution on land. However, more important than which medium we know less about is the fact that our understanding of ecological processes and pollutant fates and effects is pretty profound for both the land and the ocean environment. My assertion that the ocean deserves special consideration regarding waste disposal hinges less on our relative ignorance than on two other fundamental considerations. First, I believe that the opportunity to properly manage, including contain and confine, persistent toxic pollutants is vastly greater on land than in the ocean (this extends to avoiding harm, detecting it, and doing something about it if it happens). Second, I believe the ocean, as a "free" disposal medium--unprotected by marketplace and political forces--is far more likely than the land to be used as a first-resort waste disposal option without government intervention to make it at least marginally more difficult to manage a given waste in the ocean than on land.

7. Health of the New York Bight

a.) I agree that the New York Bight is one of the most severly degraded oceanic ecosystems in the world. This conclusion is supported both by the number, diversity, and quantities of pollutants found in Bight waters, sediments, and organisms, and by the unhealthful status of many of the Bight's biota. Numerous toxic heavy metals are enriched many-fold beyond natural levels. Chlorinated hydrocarbons, polynuclear aromatic compounds, and other persistent organic chemicals are widespread. Bight organisms suffer widely from fin rot, gill erosion, skin tumors, parasitic infestations, microbial contamination, etc. Chromosome damage and developmental abnormalities have been documented in mackerel embryos from many locations in the Bight, most notably in the vicinity of dumpsites.

b.) There is a substantial basis for the view that the assimilative capacity of the New York Bight has been exceeded for PCBs, polynuclear aromatic hydrocarbons, cadmium, and possibly lead. Specifically, a November 1978 NOAA workshop panel, meeting in Williamsburg, Virginia, concluded that "the input rates for polychlorinated biphenyls and aromatic hydrocarbons [to the New York Bight Apex] are so high that damage to public health and indigenous organisms seems quite probable" and that "cadmium and lead contamination appears to be at levels that raise questions concerning toxicity to humans via seafood ingestion, as well as impairment of aquatic communities of the Apex". The more recent (1979) Crystal Mountain Workshop, chaired by Dr. Goldberg, concluded that cadmium levels in Bight sediments could currently be approaching or exceeding safe levels for shellfish in parts of the Bight and that PCBs are within an order of magnitude of causing potentially significant human health impacts.

8. 12-mile vs. 106-mile Dumpsite

As summarized on page 10 of my prepared statement, it is difficult to express a preference for dumping at either the 12-mile or the 106-mile dumpsite. On the one hand, the 106-mile site supports a lesser productivity and density of marine life; would help avoid future fishkills and beach closings; would reduce human health impacts associated with shellfish contamination; would permit restoration of commercial shellfishing at sites closed by FDA; and would increase the cost of ocean dumping, thereby providing dumpers an added incentive to expedite land-based alternatives. On the other hand, biodegradation of organic matter may be impaired (and the material would be far more persistent); deep-sea organisms are probably much more sensitive to pollution impacts and more likely to be attracted to and contaminated by ocean-dumped contaminants; the likelihood of hazardous and undesirable short-dumping would increase; monitoring and corrective measures would be more difficult; and an out-of-sight, out-of-mind philosophy would be promoted about ocean dumping, at the 106-mile site.

Our reasons for opposing, in 1977, EPA's proposed relocation of sludge dumping from the 12-mile to the 106-mile site, are set forth in the accompanying statement presented at the EPA hearing in Toms River, New Jersey, in the spring of 1977. The Committee may or may not wish to include a copy of this statement in the hearing record.

It should be noted, however, that the 106-site may be an appropriate short-term expedient if, for example, it were determined by the courts that existing sewage sludge ocean dumping was required to be terminated as expeditiously as possible. Interim dumping at the 106-site while this phase-out occurred might be a defensible step (primarily as a means of maintaining the pressure to implement non-ocean alternatives in an expeditious fashion).

QUESTIONS FOR DR. GOLDBERG

Question 1. Ecological Health of the Oceans: Since 1970, the Congress has enacted several laws in an attempt to improve the environmental quality of the oceans (Ocean Dumping Act, Clean Water Act—to name just two). *(a)* Have these laws made an impact upon the ecological health of the oceans?

Answer. Not in a measureable way, only in inferential ways.

Question 1. (b) Has the ability of our coastal waters to support renewable fisheries and good recreational opportunities increased or decreased over the last decade?

Answer. Yes, through loss of registration of halogenated biocides like DDT and the banning of PCB production, as well as controls of marine discharges of oil, etc.

Question 1. (c) What are the most significant threats to the health of the oceans posed by man's activities over the next decade?

Answer. Runoff from land.

Question 2. Detoxifying (Self-cleaning) mechanisms: Mr. Bascom indicated in his testimony that heavy metals and certain toxic organic compounds may not be a threat to marine animals, since many of these organisms possess the ability to "detoxify" these chemicals. Do you agree with this hypothesis?

Answer. If modified by the argument that the levels of toxic metals in the marine environment are not high enough to cause damage. However, Professor F. Morel of MIT has indicated that doubling ambient copper levels can affect plant productivity. The *only* marine toxic metal problem involved mercury methyls in Minamata Bay Japan, a very unusual situation.

Question 3. PCBs in the Food Chain: In a 1979 study, concentrations of PCBs were measured in fish and shellfish collected from Long Island Sound. Concentrations averaged 3 to 4 parts per million (ppm) of PCBs for striped bass, bluefish, eel, shad, and white perch, with values for individual fish as high as 21.5 parts per million. The FDA limit for PCBs in fish flesh is 5 parts per million; in 1979 there was consideration of lowering the action level to 2 parts per million. (*a*) Do these relatively high concentrations of PCBs in fish and shellfish concern you?

Answer. No. However, there may be heavy fish eaters (i.e. over one pound per day) who might be affected, if they averaged eating an unacceptable amount. The identification of the most heavily exposed population is essential. Until, it is identified, and the risk assessed, I have no concern.

Question 3(b). If the threat from PCBs is real, what should we do about it?

Answer. We have already banned the production and use of PCBs. If there is a real jeopardy to the health of heavy seafood consumers, then we should ban the sale of seafoods containing unacceptable levels of PCBs to the critical population.

Question 4. Harbor Dredging (coal exports): Harbor dredging will certainly increase significantly over the next decade as this country develops its capabilities to export coal. (*a*) Will this increased dredging pose a threat to marine ecosystems?

Answer. Not a terrible serious one. Only short term problems on a site-specific basis.

Question 4(b). Should we begin an aggressive research program now to anticipate this development?

Answer. If by aggressive you mean expensive, my answer is no. We have higher priority problems in marine pollution than this, such as the coastal eutrophication and the continued inputs of halogenated biocides.

Question 4(c). How good are our analytical tools for predicting the impact of dredging and dredge spoil disposal?

Answer. Moderately good.

Question 5. Monitoring the Impacts of Waste Disposal: The members of your panel seem to differ in philosophy toward monitoring the impacts of waste disposal. Two of you seem to feel that we can monitor the impacts of waste disposal while we dispose of waste; two of you seem to feel that the threat of waste disposal is great enough and our ignorance vast enough that waste disposal should be severely limited now.

Answer. I must emphasize that we are disposing on land and very poorly, if at all, monitoring the impacts upon water resources and upon terrestrial ecosystems. Since it is difficult to stop waste generation, we must assess where the least possible damage will be done.

Question 5(a). Please comment on the type of ocean waste disposal strategy and the type of monitoring strategy which makes sense in light of our current knowledge? (Use N.Y. sewage sludge site as an example.)

Answer. I would continue present practices and utilize a monitoring strategy such as the benthic trophic level index developed by Bascom's group at SCCWRP.

Question 5(b). Who should be responsible for monitoring the impacts of accelerated development of offshore oil (industry, government)?

Answer. The government. If left to industry, I predict a much poorer job will be done.

Question 5(c). Please discuss the findings of your "Mussel Watch" program.

Answer. The Mussel Watch program was carried out for a three year period (1976-1978) under the sponsorship of the EPA Narragansett Laboratory through a contract with me. Four associated laboratories (Woods Hole Oceanographic Institution, University of California at Berkeley, Scripps Institution of Oceanography and Moss Landing Marine Laboratories) assisted in the program which was funded at a level of about $1,000,000. The significant findings include:

(a). The identification of the PCB pollution in New Bedford Harbor, Mass., which resulted in the closure of the commercial fishery at a cost to the local inhabitants of many millions of dollars.

(b) The establishment that the dumping of radioactive wastes off the coast of Northern California, near the Farallon Islands, did not result in any serious pollution problems and did not threaten in any way whatsoever the health of man through the consumption of seafood.

(c) The existance of "hot spots" for metals (South San Francisco Bay), for DDT (the Southern California Bight), for PCBs (Massachusetts coast) etc. Whether the hot spots posed a threat to marine ecosystems could in principle be assessed on the basis of the data.

(d) The ability of a number of academic scientists to cooperate effectively in the collection, analyses and data interpretation of a rather complex program.

Tragically, the program has been discontinued by EPA. The agency claims it is not a cost-effective activity. I argue that had we covered more stations (greater than the 107 or so) with a greater intensity of effort, we might have detected the Kepone problem in south Chesapeake Bay. My concern is now "what other pollutants that have not been assayed, such as toxaphene, may pose problems for the present or future?

Question 6. State of Knowledge regarding Ocean Pollution: Mr. Kamlet implied that the ocean deserves special consideration regarding waste disposal at least partly because our knowledge of ocean processes is poor. You stated that our knowledge of pollution in the ocean is far greater than our knowledge of pollution on land. Which of you is right? Why?

Answer. I stated that we can better predict the fates and behaviors of pollutants introduced to such sites as Dumpsite 106 or Puget Sound than can terrrestrial scientists predict the impacts and fates of toxic substances in subterranean waters. Thus, for certain sites and for certain materials, the ocean can be a more rational disposal area. I am right only in the sense that a multimedia approach is essential. Kamlet suffers the Cousteau mystique that the oceans are sacrosanct with respect to even receiving man's waste.

Question 7. Health of the New York Bight. In testimony before this Subcommittee last year, a NOAA witness stated that the New York bight is one of the most severely degraded oceanic ecosystems in the world. *(a)* Do you agree with this assessment?

Answer. No, the Bosporous, the Inland Sea of Japan, and parts of the Agean are far more degraded.

Question 7(b). Has the capacity of the New York bight to assimilate wastes been exceeded? For which chemicals?

Answer. On the basis of the Crystal Mountain report it has not been exceeded for cadmium, PCBs, nitrogen and micro-organisms.

Question. 18. 12-mile vs. 106-mile dumpsite: If you could choose between dumping sewage wastes at the site 12 miles off New York or the site 106 miles off New York, which one would you choose?

Answer. Obivously 106. The area is more dispersive of introduced materials and dispersive to the deep ocean.

Questions for Dr. Woodwell

1. Ecological Health of the Oceans

   Since 1970, the Congress has enacted several laws in an attempt to improve the environmental quality of the oceans (Ocean Dumping Act, Clean Water Act -- to name just two).

   a. Have these laws made an impact upon the ecological health of the oceans?

   b. Has the ability of our coastal waters to support renewable fisheries and good recreational opportunities increased or decreased over the last decade?

   c. What are the most significant threats to the health of the oceans posed by man's activities over the next decade?

      -- increased offshore oil exploration?

      -- sewage?

      -- runoff from land?

      -- others?

2. Detoxifying (Self-cleaning) mechanisms

   Mr. Bascom indicated in his testimony that heavy metals and certain toxic organic compounds may not be a threat to marine animals, since many of these organisms possess the ability to "detoxify" these chemicals.

   Do you agree with this hypothesis?

3. PCBs in the Food Chain

   In a 1979 study, concentrations of PCBs were measured in fish and shellfish collected from Long Island Sound. Concentrations averaged 3 to 4 parts per million (ppm) of PCBs for striped bass, bluefish, eel, shad, and white perch, with values for individual fish as high as 21.5 parts per million. The FDA limit for PCBs in fish flesh is 5 parts per million; in 1979 there was consideration of lowering the action level to 2 parts per million.

   a. Do these relatively high concerntrations of PCBs in fish and shellfish concern you?

   b. If the threat from PCBs is real, what should we do about it?

4. Harbor Dredging (coal exports)

   Harbor dredging will certainly increase significantly over the next decade as this country develops its capabilities to export coal.

   a. Will this increased dredging pose a threat to marine ecosystems?

   b. Should we begin an aggressive research program now to anticipate this development?

   c. How good are our analytical tools for predicting the impact of dredging and dredge spoil disposal?

5. Monitoring the impacts of waste disposal

   The members of your panel seem to differ in philosophy toward monitoring the impacts of waste disposal. Two of you seem to feel that we can monitor the impacts of waste disposal while we dispose of waste; two of you seem to feel that the threat of waste disposal is great enough and our ignorance vast enough that waste disposal should be severely limited now.

   a. Please comment on the type of ocean waste disposal strategy and the type of monitoring strategy which makes sense in light of our current knowledge? (use N.Y. sewage sludge site as an example)

   b. Who should be responsible for monitoring the impacts of accelerated development of offshore oil (industry, government)?

6. Health of the New York Bight

   In testimony before this Subcommittee last year, a NOAA witness stated that the New York Bight is one of the most severely degraded oceanic ecosystems in the world.

   a. Do you agree with this assessment?

   b. Has the capacity of the New York Bight to assimilate wastes been exceeded? For which chemicals?

7. 12-mile vs. 106-mile Dumpsite

   If you could choose between dumping sewage wastes at the site 12 miles off New York or the site 106 miles off New York, which one would you choose?

Responses to questions directed to G. M. Woodwell
by Subcommittee on Natural Resources, Agriculture Research,
and Environment of the Committee on Science and Technology,
U. S. House of Representatives by letter of March 25, 1982.

Question #1: Ecological Health of the Oceans...

a. Have these laws [passed since 1930] made an impact on the ... health of the oceans?

b. Has the ability of our coastal waters to support...fisheries and...recreation increased or decreased...?

c. What are the most significant threats...of the next decade...?

Answers:

a. The common objective of these laws is management of renewable resources in such a way that they are in fact renewable. The most important resource of the coastal zone is the fisheries; if the requirements for preserving the fisheries are met, other needs, including those of human health and recreation, but not waste disposal, will have been protected. Protection of the fisheries requires much more than control of fishermen. It requires very close attention to the details of the chemistry of the coastal zone; it requires a progressively restrictive policy on disposal of wastes, protection of estuaries, estuarine marshes, and rivers and their drainages. It also requires control of the quality of air because sufficient quantities of toxic substances can be carried in the atmosphere to present serious pollution problems far from the point of release.

The evidence is that the laws have provided an important first step in protecting the coastal waters. The Council on Environmental Quality (Annual Report of 1980, p. 16) reported that under the permit system required by the Marine Protection Act of 1972 the dumping of wastes regulated by the EPA dropped from about 10.8 million tons in 1973 to 8.7 million in 1979 because of a drop in industrial dumping. The dumping of municipal sewage sludge has increased. And the dumping of dredge spoils, by far the largest activity in oceanic dumping, is also increasing. The combined effect is progressive degradation of coastal waters. The laws need strengthening and, as I have indicated in my earlier testimony, additional research is needed to find a larger array of potential solutions.

b. The capacity of the coastal zone to support fisheries and recreation is a complex function of several factors, including the intrinsic characteristics of such areas as Georges Bank as well as policies in management of the fisheries and in disposal of wastes. Growth in demand on all these resources is resulting in continued degradation.

Stewardship of the resources requires progressive and effective steps that enable intensified use without degradation. The various laws we have enacted over 15 years, including the Ocean Dumping Act and the Clean Water Act, have not only defined a clear, effective, and necessary policy, but have established mechanisms for implementing that policy. Without these steps the problems of pollution would have been substantially worse. The best document available in analysis of progress is the Annual Report of the Council on Environmental Quality for 1980. The decision by the present administration to curtail this office is directly contrary to the public interest and the intent of Congress expressed in the National Environmental Policy Act of 1969.

c. The most serious threats to the oceans, and especially the coastal oceans, are from the cumulative influences of low-level, chronic pollution with a wide range of substances from hydrocarbons through toxic metals. In many instances the pollution is irreversible in any time of interest to us... and the effects are also irreversible. The problem is sufficiently serious and immediate to warrant concerted action on the part of the federal government in the context of the steps I outlined in my testimony. An emphasis on any single source as the greatest hazard is inappropriate in that it is the cumulative effects that must be avoided. The current hazards from oil development in the coastal zone are of course a major concern.

2. Detoxifying mechanisms.

Mr. Bascom indicated ... that heavy metals and certain toxic...compounds may not be a threat to marine animals...

Answer:

I have difficulty interpreting Mr. Bascom's comments. He seems to be saying that low concentrations of toxic substances are not toxic to animals and are therefore not a problem. I find the comment, applied to the hazards of pollution in the coastal waters, irrelevant and misleading.

Firstly, the energy to support life in all waters is fixed by plants. Specific plant populations support specific animal populations. Toxic substances affect plant populations differentially; some populations are sensitive to changes as simple as a shift in the ratio of nitrogen to phosphorous; others are less so. Animal populations are vulnerable to the shifts in the plant populations and to direct effects of toxins. There is very little basis for asserting that there is a threshold for such changes; they appear to be continuous. That means that effects are measurable in response to virtually any change in the chemistry of environment. The evidence for this series of statements is extensive. I do not see how the evidence can be interpreted as supporting Mr. Bascom's statements.

Secondly, there is a large body of evidence that certain toxic substances are accumulated from very low concentrations in water, air, or soil to high concentrations in living systems. The mechanisms that result in accumulation are several and complex and, while these same mechanisms may reduce concentrations in certain segments of an ecosystem, the processes are real enough and offer no basis for the assurances of Mr. Bascom that natural systems work universally to protect themselves. They don't. The communities simply change in response to the toxic effects.

Finally, Mr. Bascom is correct in his assertion that certain organisms survive pollution. But the communities of plants and animals that survive are degraded as I have shown in my earlier testimony. These communities contain high levels of the toxins that caused the impoverishment and present a wide range of problems for man. The transitions to impoverishment are also continuous. Reliance on the detoxifying effects of liver enzymes, present in certain organisms but effective only at considerable cost to the individuals, seems little more than wishful thinking.

Toxins and toxic effects do, of course, diminish with time. Toxins may be degraded metabolically or sedimented and removed from circulation. When these processes are slow by comparison with the rates of production, sufficient quantities may accumulate in the environment to present serious hazards. The discussion of PCB's below provides one example.

3. P.C.B.'s in the Food Chain.

a. ...do the concentrations of PCB's in fish...in Long Island Sound...concern me...?

b. ...what should be done?

a. PCB's are but one example of industrial products that are accumulating in the oceans. The problem they present must be taken as indicative of the larger problem in management of all such substances that are produced in large quantities and are released into nature. The objective should be to avoid such contaminations in the future. Correcting the existing contamination is not possible. Mitigating it may be.

The existing contamination with PCB's supports, as you observe, concentrations of PCB's in certain fish of the eastern seaboard of 3-5 ppm. Food containing such concentrations contributes significantly to the accumulation of PCB's in human adipose tissue and, although direct effects on people are difficult to measure, there is no basis for belief that such toxins improve human health. The issue presents an important warning: the coastal oceans are being degraded significantly, the cost is the loss of fisheries, the contamination of human food chains, and the toxification of man.

The most important step is establishment of systems of management that will avoid future errors in the same context. I have outlined what these steps might be.

b. Specific steps to mitigate the PCB problem are more difficult. A few kilograms of PCB's are enough to contaminate all the fish of the coastal zone and to present a serious threat to man. Thousands of kilograms are present in sediments of rivers and harbors. Disturbing those sediments will mobilize the PCB's and other toxins. While it might be conceivable that an effective system of removing the sediments and toxins could be developed, the cost would be extraordinarily high. I know of no practical solution at the moment beyond the avoidance of further contamination. The most important gain may be in the lesson, apparently not learned from previous experience, that the cost of prevention of pollution is far less than the cost of the damage and attempts at repair.

4. Harbor Dredging

a. Will...increased dredging pose a threat to marine ecosystems?

b. Should we begin an aggressive research program now...?

c. How good are our analytical tools for predicting...[effects] of dredging and spoil disposal?

a. There is no doubt that the dredging of harbors and the disposal of dredging spoils will mobilize toxins such as the PCB's, discussed above. Any acceptable solution will be awkward, expensive, and time consuming. There is at present no solution that will protect all interests. Although at the moment an inexpensive and effective solution is difficult to imagine, the possibility exists that a system can be developed for dredging without aggravating pollution problems. Such a system would probably involve special processing of spoils by a dredging vessel. It might involve terrestrial as opposed to oceanic disposal. Such steps are part of the cost of of failure to contain pollutants.

b. There is an obvious and immediate need for research on this topic.

c. We have adequate techniques for anticipating the problems inherent in disposal of dredging spoils. The problems lie in acceptance of the information and conclusions because the action indicated is inevitably awkward, expensive, and unpopular with those who must solve the problem.

5. Monitoring

6. Health of a New York Bight

7. 12 Mile vs. 106 mi. Dumpsite

These three issues are closely overlapping, I shall answer them jointly.

The problems posed by New York City must be separated from the problems of waste disposal in general. The general problem requires immediate, aggressive innovation in the context I have outlined in my testimony. The problem of New York's wastes requires a no less aggressively imaginative approach, but appears to offer no reasonable, inexpensive, and effective short-term solution.

The challenge is to avoid the proliferation of problems similar to that of New York City around the world. While we have no jurisdiction, of course, outside the U.S., there is no question that our actions are taken as examples by other nations.

There is no possibility of redesigning New York's waste handling system in any fundamental way in a short time. Nor is there a clear and effective design available at the moment that would resolve the problem. Any immediate solution is partial and temporary. Two steps are possible at the moment and appropriate.

The total amount of liquid waste is a function of the total use of water. Any step that is designed to conserve water will reduce the volume of wastes to be treated, the burden on treatment plants, and the amount of waste carried through the plants into coastal waters. Separation of storm drains from the sewage system is one such step; so is the metering of water. These are clearly desirable transitions that can be effected as the city is gradually rebuilt. But they are not the only steps. I have indicated in my earlier testimony the need for continuing research to discover new ways of reducing wastes at the source, including the recycling of water.

The immediate relief of the serious problems of the New York Bight requires use of Dumpsite 106. The use of Dumpsite 106 should be coupled with continued efforts to reduce the need to use oceanic disposal, with steps to prevent the dumping of industrial wastes, and with efforts to separate toxins from domestic sewage. These efforts can and should be requirements in all new construction and in certain renovations, both of which are continuous processes in all cities.

G. M. Woodwell

April 20, 1982

coastal water research
Southern California Coastal Water Research Project
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March 30, 1982

Dr. Bob Palmer
Committee on Science and Technology
Sub Committee NARE Room 820
House Office Building Annex #1
Washington, DC 20515

Dear Dr. Palmer,

Enclosed herewith is my testimony, in relatively readable form. Also enclosed are my answers to the questions from Mr. Scheuer and some auxiliary pages from other reports that may be helpful.

The tone of the questions is highly biased, as though the questioner had been convinced by the press or some unscientific reports that the ocean is in bad condition now. I spent a good deal of time on the answers -- especially on defining terms which are often confused and make it hard to hold rational discussions. Please remember that the world -- even before men -- was not pure and pristine. Environmental studies must be made relative to the real world -- not to the absolute zero of someones imaginations.

I hope its all helpful.

Sincerely,

Willard Bascom

Willard Bascom
Director

WB/lg

Enclosure

Questions for Mr. Bascom

1. Ecological Health of the Oceans

Since 1970, the Congress has enacted several laws in an attempt to improve the environmental quality of the oceans (Ocean Dumping Act, Clean Water Act -- to name just two).

a. Have these laws made an impact upon the ecological health of the oceans?

b. Has the ability of our coastal waters to support renewable fisheries and good recreational opportunities increased or decreased over the last decade?

c. What are the most significant threats to the health of the oceans posed by man's activities over the next decade?

-- increased offshore oil exploration?

-- sewage?

-- runoff from land?

-- others?

2. Detoxifying (Self-cleaning) mechanisms

You have indicated that heavy metals and certain toxic organic compounds may not be a threat to marine animals, since many of these organisms possess the ability to "detoxify" these chemicals. Yet in an August 1981, NOAA report ("Annual Report on the Health of the Northeast Coastal Waters of the U.S."), we find the following statements:

"....fishery resources of the Western North Atlantic are contaminated with petroleum hydrocarbons and PCBs. Species occurring over a wide range, from the coastal waters of the New York Bight apex to the outer continental shelf-slope break, showed unexpected high levels of these contaminants."

-and-

"...evidence points to a higher incidence of skeletal deformities, mutagenic abberations, and various shell or skin lesions in organisms collected inshore and in and around dumpsites, strongly supporting evidence for deleterious effects of ocean dumping and coastal discharge."

a. If marine animals are able to detoxify these contaminants so readily, why is there so much evidence of biological damage in polluted coastal areas?

3. Harbor Dredging (coal exports)

Harbor dredging will certainly increase significantly over the next decade as this country develops its capabilities to export coal.

a. Will this increased dredging pose a threat to marine ecosystems?

b. Should we begin an aggressive research program now to anticipate this development?

c. How good are our analytical tools for predicting the impact of dredging and dredge spoil disposal?

4. Monitoring the impacts of waste disposal

The members of your panel seem to differ in philosophy toward monitoring the impacts of waste disposal. Two of you seem to feel that we can monitor the impacts of waste disposal while we dispose of waste; two of you seem to feel that the threat of waste disposal is great enough and our ignorance vast enough that waste disposal should be severely limited now.

a. Please comment on the type of ocean waste disposal strategy and the type of monitoring strategy which makes sense in light of our current knowledge. (use N.Y. sewage sludge site as an example)

b. Who should be responsible for monitoring the impacts of accelerated development of offshore oil (industry, government)?

5. Health of the New York Bight

In testimony before this Subcommittee last year, a NOAA witness stated that the New York Bight is one of the most severely degraded oceanic ecosystems in the world.

a. Do you agree with this assessment?

b. Has the capacity of the New York Bight to assimilate wastes been exceeded? For which chemicals?

6. 12-mile vs. 106-mile dumpsite

If you could choose between dumping sewage wastes at the site 12 miles off New York or the site 106 miles off New York, which one would you choose?

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Response to questions from Mr. Scheuer

in his letter of March 25, 1982

1. Ecological health of the Ocean

First, to define oceans, these are huge bodies of water unlikely to be influenced much by man. My project (SCCWRP) is concerned with open coastal waters on the continental shelf. Some persons confuse landlocked bays and harbors with ocean. My remarks here refer to "open coastal waters".

a. I doubt that laws have had very much effect but they have kept past problems from getting worse. We do not know what would have happened without the laws.

b. I believe coastal waters have stayed about the same as far as the effects of waste are concerned. Natural oceanic changes are a far bigger influence.

c. I do not believe that any of the items mentioned are significant threats to the health of the oceans or even to coastal waters. The so called "impacts" have been much exaggerated by persons who have not studied the problems or compared what happens with unaffected areas.

2. Detoxifying mechanisms

(self cleaning is not the proper phrase. A major form of toxicity is damage to enzyme systems; the evidence we have shows how these are protected by sequestering proteins)

What I tried to say was that although in a laboratory an animal can be presented with an overwhelming and unmanageable amount of some contaminant, this could rarely, if ever, happen in the sea. At the levels and at the availability that contaminants reach in the sea, animals have natural means for protecting themselves. The problem is not in the sea but in the use of standards derived from unrepresentative laboratory experiments.

Now to the quotation.

As I said in testimony (page 55) any increase above background is contamination -- it does not imply damage. Pollution is a damaging excess! Thus, if any man-made products were found that is contamination. As for "unexpected high levels, etc.", what did the author expect? The right question is: Was there any damage to animals observed? The mere presence of tiny amounts of PCB in an animal's body does not signify damage. We find PCB in fish sampled hundreds of kilometers west of Costa Rica. This is more a comment on the precision of modern chemistry than on damage. As for measuring petroleum hydrocarbons in animals, I doubt it was done. It's almost impossible

The second quote, about skeletal deformaties etc. is answered in my testimony (page 55-56). Ecology is a relative science. One compares an area not affected by man (control) with the allegedly affected area to see what is different. When the author of that quote says "evidence points to ..." I expect him to show that skeletal deformities, abberations, skin lesions, etc. are worse in the NY Bight than in an unaffected part of the world that is similar. Otherwise it is only his opinion that there are effects.

Another possible hypothesis is as follows:

Suppose all the problems mentioned are normal (natural). In an unaffected area predators would eat the slow and deformed. Thus, if the predators are caught by fishermen, the slow and deformed fish remain and are relatively more prevalent. This was true during the first decades of the Salton Sea, before a crop of predators developed.

a. Why is there so much evidence of biological damage in polluted coastal areas?

First, I doubt that there is much evidence of damage. Which ones did you have in mind? In southern California there is not although at one time an overwhelming amount of DDT-DDE was discharged that did cause damage. There have been changes in bottom animals in which the number of species has diminished while the number of individuals and the biomass has increased. Is that damage or improvement? See some enclosed explanations from our Commission Report of several years ago.

I am surprised by the opening phrase: "If marine animals are able to detoxify..." Let me assure you that our most critical scientific colleagues accept our work (and that of NIH from which the glutathione data comes). These is no doubt about it. The problem (see my remarks p. 19) is that it is difficult to keep bureaucrats or congressmen informed about leading-edge research.

3. Harbor Dredging

   a. Increased harbor dredging will not pose a threat to marine ecosystems. Nor is there much evidence it ever has. (I am reporting to the Corps of Engineers on this on April 13).

   b. Your agressive program should be to inform those who need to know about the facts.

   c. Ours at SCCWRP are quite good and we will be glad to train others.

4. Monitoring the impacts of waste disposal.

First, you must understand that the main purpose of monitoring is to insure compliance with disposal regulations. (See attached sheet on ROMP). This assures that monitoring is wedded to disposal.

Quite a separate matter is research into what happens in the ocean (that's what we do at SCCWRP) and the extent of our ignorance. When I spoke on the evening after the hearing my remarks dealt entirely with what we know now. I believe much more is known about coastal waters than about most alternate land disposal sites. I would be glad to answer any specific questions about things that allegedly are "not known".

   a. Waste disposal strategy (NY sludge as example)

   My observations on the NY area are those of an outsider who generally knows the situation but has not personally studied it. First there is considerable confusion about what causes the effects that are observed. Sewage sludge (not well described -- has it been screened? to what size?) at the 12 mile dumpsite is usually blamed. However, the outflow from NY harbor which contains everything else is probably equally at fault and looks worse in the satellite pictures. If one reads C. G. Gunnerson's summary paper on "The NY Bight Ecosystem" (from Marine Environmental Pollution, Amsterdam 1981) there are many pages detailing specific pollution events, none of which are connected with sludge or other ocean dumping.

   In order to have an ocean strategy -- and specifically identify dumping effects -- it is first necessary to put the dumpsite where its effects will not be confused with other sources. This means further offshore -- not necessarily for pollution reasons. Instead this solves measuring, understanding, and political problems.

b. Most offshore oil monitoring now being done is for political reasons, not because there is likely to be damage from spilled oil. Repeated reports by EPA and NOAA of large oil spills from Argo Merchant and Ixtoc have shown very little damage. Research and base-line measurements are done to provide evidence for lawsuits instead of useful scientific information.

The government and the oil operators should both be responsible -- but they should make only useful measurements to answer likely questions. Keeping track of possible problems need not be expensive.

5. Health of N.Y. Bight

a. Compared to what is it"severely degraded."? Did the witness rate it relative to Marseilles, Liverpool, Istanbul, Napoli, Hamburg, Piraeus, Rio, Hong Kong, etc.? What was damaged? By what? How does anyone know what to agree with without data? My guess is the witness doesn't really know.

b. The phrase assimilative capacity has never been defined with numbers (SCCWRP has proposed a way of doing this to NOAA). This question could be answered if the right data had been taken.

6. 12 mi vs. 106 mile dumpsite

The problem is largely one of responding to New Jersey Congressmen. They are pressured by their uninformed constituents who believe that moving the dump site will change the present situation (see my answer to 4).

I think you should move the dump site just far enough to (1) separate its effects from the rest of N.Y. harbor and (2) satisfy the N.J. congressmen.

Probably 25 to 50 miles will accomplish those things.

QUESTIONS FOR DR. MARLENE EVANS

Question 1a. How will the proposed elimination of the research funds for this office in FY 1983 prevent the U.S. from meeting its commitment to Article VI of the Great Lakes Water Quality Agreement of 1978?

Article VI of the Great Lakes Water Quality Agreement of 1978 states that the United States and Canada shall continue to develop and implement programs to meet the General and Specific Objectives of the Agreement. The Article further itemizes programs for the abatement and control of pollution from municipalities, industries, land use activities, shipping, and dredging. Such pollution includes eutrophication, hazardous substances, persistent toxic substances, and airborn pollutants. The Article calls for the implementation of a coordinated surveillance and monitoring program. The purposes of such a program are to assess compliance, evaluate water quality trends, identify emerging problems, and investigate of the achievement of the General and Specific Objectives of the Agreement.

Previous and proposed budget cuts have and will continue to adversely affect the ability of the United States to meet its commitment to the Great Lakes Water Quality Agreement of 1978. The International Joint Commission already has expressed its concerns with declining funds for surveillance and monitoring. According to a recent report, reduced funding will result in shortcomings in the determination of total phosphorus for the Upper Lakes (essential information for managing eutrophication), restrictions of laboratory capabilities, and reduced nearshore sampling. As a result of budget cuts, monitoring and surveillance may be restricted to activities described by law. Such restrictions are not within the spirit of the Agreement which requires both countries to conduct studies to identify emerging problems. Laws regulating waste discharges, usage of certain chemicals, land use activities, etc., are developed only after the problems are present, and scientists, lake managers, and planners have demonstrated the need for such laws. One of the Objectives of the Agreement is to manage the Lakes before such problems develop.

Through the Great Lakes Water Quality Agreement of 1978 Canada and the United States agree to work towards restoring and maintaining the chemical, physical, and biological integrity of the Great Lakes waters. It recognizes that the quality of these waters changes both for the better and for the worse. Reduced nutrient loadings in municipal discharges improve some aspects of water quality in urban areas but less developed regions of the Lakes may continue to be adversely affected by nutrient inputs from agricultural runoff. Heavy metals may continue to adversely affect an urban area even though reduced nutrient loadings result in reductions in phytoplankton standing stocks. The Agreement recognizes that new issues will emerge either as a result of new contaminants entering the Lakes or as a result of new understanding. The previous successes of the 1972 and 1978 Agreements have been based on the recognition that the specific programs must be flexible, allowing for the development and improvement of surveillance activities.

The proposed budget cuts jeopardize the Agreement in several ways. The budget cuts affect the ability of the United States to meet its commitment for surveillance and monitoring. The Great Lakes National

Program Office, which is responsible for coordinating American surveillance and monitoring activities, has had its 1981 budget of 11 million dollars reduced to a proposed 3.8 million dollars in 1983. The International Joint Commission has not indicated the need for less surveillance and monitoring on the Lakes. Rather, the Commission has indicated that more studies should be conducted in order to further manage eutrophication and protect the Lakes from hazardous and toxic substances.

The Large Lakes Research Station at Grosse Ile is scheduled for closure in 1983. This laboratory is responsible for much of the analysis of the surveillance and monitoring data. It is instrumental in developing mathematical models quantifying nutrient dynamics in the Great Lakes and the laboratory had a major role in formulating the 1978 Agreement. The Laboratory is conducting vital research towards understanding the effectiveness of the remedial phosphorous actions. Surveillance and monitoring data collected since the remedial actions were initiated will be used to test several mathematical models of nutrient dynamics. On the basis of such tests, refined models will provide valuable information for the formulation of the new Agreement. By closing this laboratory, the United States will be less able to meet its commitment in the 1978 Agreement to assess how well the Specific and General Objectives of the Agreement are being met and to adequately assess water quality trends. The identification of emerging issues requires that laboratories such as the Large Lakes Research Station remain functional. The Station's new toxics program which suggests the contaminant toxaphene is widespread throughout the Great lakes must be taken to completion.

The Great Lakes National Program Office and the Large Lakes Research Station are not the only Federal agencies whose activities enable the United States to meet its commitments to the Water Quality Agreement of 1978. The Great Lakes Environmental Research Laboratory (NOAA) has conducted research in phosphorus inputs to the Great lakes which were used in formulating the 1978 Water Quality Agreement. Its toxic substances program, including the investigation of polyaromatic hydrocarbons, is identifying emerging issues for Great Lakes protection. Sea Grant's program in toxic substances, particularly PCBs, had a major role in demonstrating that PCBs were of major environmental concern in the Great Lakes. Its continuing programs in toxic substances (including a developing toxaphene program) also will identify emerging issues for the renegotiation of the 1978 Water Quality Agreement. Environmental problems facing the Great Lakes are complex and solutions require multidisciplinary study. Federally-funded agencies have dealt and continue to deal with various aspects of these problems. By reducing funding to these Federal agencies and crippling their activities, the United States will not be fulfilling its commitments to the Water Quality Agreement of 1978. Furthermore, since the Agreement is scheduled for renegotiation in 1983, the budget cuts will be such that the United States will not be able to participate in effectively in the formulation of the new Agreement.

Question 2a: What are some of these chemicals and what are their environmental impacts?

Approximately 9,200,000 tons of hazardous wastes are generated annually in the Great Lakes states. Industries producing these wastes include chemical and applied products (44%), primary metals (16%), fabricators of metal products (13%), paper and allied products (10%), transportation equipment (6%), and petroleum and coal products (4%). Of the wastes, 50% are chemicals, 28% sludges, 12% acids and alkalies, 6% solvents, and 4% oils. These waste compounds vary in their toxicity and environmental behavior. The Great Lakes Water Quality Agreement of 1978 lists 270 hazardous polluting substances and an additional 106 potentially hazardous polluting substances. Since the Agreement was enacted, dioxins, chlorinated alkanes, chlorinated styrenes, chlorinated dibenzofurans, and polynuclear aromatic hydrocarbons have been identified as new contaminants for future Objectives.

Salts such as chloride and sulfate are normal constituents of natural waters but at high concentrations are toxic. Over the last few decades, salt loadings from industrial, urban, and agricultural sources have increased the salinity of the Great lakes, particularly Lakes Erie, Ontario, and Michigan. The environmental effects of increased salinity are poorly understood. Some researchers believe that increased salinity alters the composition of indigenous biota. Recently, a number of brackish-water organisms (the red algae Bangia, the phytoplankton Skeletonema and Actinocyclus, and the zooplankton Eurytemora affinis) have become more abundant in the Great Lakes: these taxa apparently were absent or rare in the first half of the century.

Heavy metals are hazardous. They are produced by a wide variety of industries and are used as antiknock agents in gasoline, paints, pesticides, electroplating, glass, antislime agents in pulp and paper industries, and in batteries. Such metals include mercury, lead, arsenic, copper, chromium, iron, selenium, and zinc. Heavy metals are not particularly water-soluble and tend to occur in highest concentrations in the sediments. As a consequence, harbor areas often contain high concentrations of heavy metals. The biota inhabiting such regions are similarly contaminated. Heavy metals are highly toxic: concentrations of a few parts per million adversely affect biota. Since organisms bioaccumulate heavy metals, they are harmful to humans who ingesting them. Mercury causes brain damage and birth defects while arsenic damages the liver, kidneys, digestive system, and bone marrow. Regulations have been established regarding heavy metal concentrations in water and in fish. In the 1960's, high concentrations of mercury resulted in fishing bans in Lake St. Clair and Lake Erie.

Ammonia is a hazardous chemical which occurs in municipal discharges and as a byproduct of some industries. High concentrations of ammonia are toxic to fish. In addition, ammonia reduces the oxygen content of water with a resultant increase in the concentration of heavy metals. It occurs in a variety of chemical forms including associations with heavy metals. It is a compound of identified (Great Lakes Water Quality Agreement of 1978, EPA) concern.

Asbestos fibers are produced as a result of iron mining. The fibers are of environmental concern in western Lake Superior. High concentrations of asbestos fibers impair fish development and are believed to be carcinogenic to humans. Although the mining company which released asbestos fibers into western Lake Superior was required by law to dispose of the tailings in land disposal sites, the remaining fibers threaten the health of people utilizing the lake as a municipal water supply.

A wide variety of hazardous organic compounds present environmental hazards to the Great Lakes. Petroleum and oil byproducts form surface films and coat sediments, interfering with normal lake metabolism. Many of the more volatile petroleum byproducts are toxic. Oil and petroleum byproducts are of particular concern in harbor areas, shipping lanes, and in areas of lake drilling.

The most hazardous organic compounds are synthesized chemicals. Many of these compounds are fungicides, herbicides, and insecticides whose major function is to impair or kill certain groups of organisms. DDT is a familiar example. Such toxic compounds are not easily metabolized and persist in the environment for long periods of time. Furthermore, many of the compounds bioaccumulate in organisms: concentrations of toxic organics frequently are highest in vertebrates such as fish. Humans ingesting such contaminated fish are subject disorders caused by high concentrations of these toxic substances.

Mirex, an insecticide, fire retardant, and plasticizer, was produced and processed in the Great Lakes region. Mirex is a highly toxic compound and is bioaccumulated by fish. As a result of mirex contamination, fishing bans were imposed for the Niagara River and Lake Ontario in the late 1970's. Fish in these regions continue to contain appreciable levels of Mirex.

Dioxin, a byproduct of the manufacture of 2,4,5,-T and of improper incineration, is also a toxic organic. High concentrations of dioxin have been detected in [illegible]ginaw Bay and Lake Ontario. As a result, the New York State Health Department has recommended that people consume no more than one fish meal per month. Children and women of childbearing years are particularly warned against consuming Lake Ontario fish.

Polychlorinated biphenyls were produced in the Great Lakes region and had a variety of uses. PCBs are highly toxic: concentrations as low as a few parts per billion adversely affect normal physiological function of algae, invertebrates, fish, and other vertebrates. PCBs bioaccumulate in organisms. Fish can contain relatively high concentrations of PCBs (parts per million versus parts per trillion in water). Because PCBs are toxic, bans have been placed on the sale of contaminated fish for human consumption. High PCB concentrations devastated the carp fishery in Green Bay and the salmonid fishery in Lake Michigan. Concentrations remain high in certain areas of Lakes Michigan, Ontario, and Erie despite bans on PCB usage.

Polyaromatic hydrocarbons are organic compounds produced as a result of fossil fuel combustion. They consist of a large number of compounds, many of which are highly stable chemically. Many PAH's are toxic to organisms and are suspected to cause cancer in humans. Relatively little is known about the environmental effects of PAH's and the newer compounds (chlorinated alkanes, chlorinated styrenes, and chlorinated dibenzofurans, toxaphene) identified as new toxicants of environmental concern.

Question 2b: What research needs to be conducted in order to understand these environmental impacts?

There are several areas where further research must be conducted in order to understand the environmental effects of hazardous chemicals. In addition, research must be conducted to prevent future problems from developing.

Monitoring studies are required to document the concentrations of hazardous chemicals in the various regions of the Great Lakes and the temporal variability of these contaminants. Such research is vital to investigate the effectiveness of remedial action, to pinpoint problem areas, and to avoid future problems. When the DDT was banned, levels in Great Lakes fish declined relatively quickly. Conversely, when PCB was banned, there was a much longer lag time before PCB levels began to decline. Each compound behaves uniquely and information generated from one study may not be completely applicable to the next study or from one region of the lake to another.

Research must be conducted on the movement and transport of hazardous chemicals within the Great Lakes ecosystem. The atmosphere represents a major input source for a variety of chemicals such as lead, PCBs, and toxaphene. Other sources are industrial and municipal discharges, tributaries, runoff from land, groundwater, and accidental spills. The loss of compounds occurs through a variety of routes. Some compounds are extremely volatile and re-enter the atmosphere. Other compounds are transported to the sediments where they may be buried by sedimenting material, resuspended, or transported by bottom currents to other regions of the lake (or to other lakes). By understanding the movement of hazardous substances in the Great Lakes ecosystem, researchers and managers can more effectively remedy problems and avoid future damage.

Research must be conducted on the metabolism of hazardous chemicals. To what extent do organism bioaccumulate various chemicals and how readily are these chemicals metabolized or excreted? What are the lethal and sublethal effects of hazardous chemicals at the species level? What are the community level effects of hazardous chemicals? Do increased concentrations of dissolved salts or toxic organics cause a change in overall community structure and function? What are the combined effects of several hazardous chemicals? Does the presence of high concentrations of one chemical (e.g. mercury) increase the sensitivity of an organism to another chemical (e.g. copper)?

Research must be conducted on analytical procedures, particularly for organics. Many of the toxic organics consist of a wide variety of compounds: for example toxaphene has more than 100 chemical forms. New analytical procedures must be developed to quantify such compounds and to develop standardized techniques.

Research must be conducted on effective ways of disposing of hazardous substances. Improper incineration can result in increased atmospheric deposition of compounds such as PCBs and in the formation of dioxins and polyaromatic hydrocarbons. Better methods for utilizing land disposal sites must be developed. There is concern that inadequate practices have damaged ground water. This recently was confirmed at Montague, Michigan, where the responsible company must now invest several millions of dollars to remedy the problem. Love Canal and Waukegan Harbor are additional examples of inadequate waste disposal practices. Research on waste disposal practices will reduce the likelihood of such events occurring on the future.

Research must be conducted on improving land use activities. Many pesticides, fertilizers, herbicides, and fungicides enter the lakes from agriculture and dairy land. Furthermore, salts and heavy metals enter the lakes from urban runoff. Research on agricultural practices, storm water systems, etc., will reduce such pollution in the future.

Question 2c. Are any studies being directed toward cleanup of these toxic chemicals? Is such research being eliminated by the Federal government? If eliminated, will the States support research to cleanup the Lakes?

Studies are being conducted to reduce the presence of toxic chemicals in the Great Lakes. The monitoring and surveillance studies are determining the concentration and distribution of hazardous chemicals in the Lakes and provide information on whether or not remedial plans are sufficient. Other studies are investigating input sources of contaminants to the Great Lakes. Federal laboratories are investigating natural processes which reduce the concentration of contaminants in the water column: sedimentation, mixing within the sediments, photolysis, and volatilization. Research also is being conducted on more effective ways to dispose of toxic substances.

Much of this research has been or will be eliminated by the Federal budget cuts. The surveillance and monitoring activities conducted by the Great Lakes National Program Office will be reduced. In 1981, the Laboratory was funded at approximately 11 million dollars while the 1983 budget is approximately 3.8 million dollars. Since concern for hazardous chemicals has increased and not decreased, the proposed 1983 funding clearly will not be sufficient for effective management of the Lakes. The Large Lakes Research Laboratory is scheduled for closure. It is one of the few laboratories investigating toxaphene. Its detailed study of PCBs in Saginaw Bay, including development of a mass balance model, will not be completed. This is the most detailed study of its kind and would represent a major contribution to the world's understanding of the movement of contaminants. The Great Lakes

Environmental Research Laboratory has a detailed program investigating processes by which toxic substances are transported from surface inputs to sedimentary sinks, resuspended, and transported to other regions of the lake (or lakes). Furthermore, the laboratory has a program investigating the toxicity of polyaromatic hydrocarbons. This will be eliminated with the proposed closure of the Laboratory. Sea Grant has strong programs in toxic substances and has contributed much to the understanding of PCBs. It is now developing a toxics program focussing on toxaphene. This coordinated study will not materialize if Sea Grant is eliminated. The Great Lakes Basin Commission was a planning agency which, among other activities, investigated waste disposal practices: this Commission was terminated in 1982.

The States have and will continue to conduct research to reduce toxic substances in the Great Lakes. However, the approach of such laboratories is regional, focussing on the nearshore area. As stated in the original testimony, hazardous substances and excess nutrients enter the Lakes from a number of sources and then are dispersed throughout the Lake (or Lakes). Effective management of the Lakes requires that research investigate whole-lake processes. State laboratories, because of their regional interests, cannot accomplish this as effectively as Federal laboratories. Federal scientists, by conducting research on all the Great Lakes, have a more complete understanding of whole-lake functioning. As a result of Federal research, these scientists have been able to develop whole-lake models which have had a major role in synthesizing our understanding of lake function. Many of the remedial actions (phosphorus limitations) have been based on such models.

State laboratories have experienced severe budget cuts. There is no indication that the loss in Federally-funded research will be compensated for by greater State effort. Rather, the loss in Federal funding is even more severe given similar losses in State-funded research. Many of the Federal scientists who already have been affected by the budget cuts have found new jobs outside the Great Lakes region. Thus, there has and will continue to be a real loss in research activities devoted to restoring and protecting the quality of Great Lakes waters.

Question 3a. In a worst case scenario, what will be the impact of the loss of research over the long-term, say 20 years.

In a worst case scenario, the loss in research funding over 20 years will be catastrophic. The Great Lakes already have undergone severe degradation in water quality- the fisheries have been irreversibly altered, the lakes have become more eutrophic, and a wide variety of toxic chemicals threaten the health of people utilizing these resources. Through research, problems have been identified, solutions proposed, legislation developed, and many of these problems reduced. However problems remain which potentially will grow to severe proportions over the next twenty years in the absence of sufficient research and planning activities.

Phosphorus inputs to the Lakes through municipal discharges have decreased. However, excessive nutrients continue to enter the Lakes in runoff from agricultural areas, storm water systems, and atmospheric deposition. Further research is necessary to determine the effectiveness of current actions. Without continuing research, it is probable that the Lakes will continue to become eutrophic.

Eutrophication has several adverse effects. With increased nutrient loading, there is a steady increase in nuisance algal blooms. In the past, such blooms have contributed to the clogging of sand filters at water intakes, given waters a noxious taste, and have contaminated beaches. Increased eutrophication often reduces oxygen concentration of the deeper waters of lakes. In recent times, low oxygen concentrations in Lake Erie waters resulted in the loss of several important deepwater and benthic organisms. With increased eutrophication in the Great Lakes, there will be further declines in deepwater oxygen concentrations with probable adverse effects on coldwater fish. With decreased oxygen concentrations, heavy metals become more water-soluble: as a consequence, heavy metal toxicity increases. With the continued input of heavy metals into the Lakes, the environmental damage produced by hazardous substances will intensify. The mercury catastrophes of the 1960's will repeat themselves again and again.

With less research over the next two decades, toxic chemicals will continue to threaten the health and well-being of the people inhabiting the drainage basin. Contaminants such as dioxin, PCBs, mirex, mercury, and the myriad of new compounds of concern will continue to enter the Lakes, bioaccumulate in organisms, and move through the food web. Without research, scientists will not fully understand problems nor be able to effectively manage the Lakes. More than likely, researchers will become aware of a problem after the damage has been done. Great Lakes fish will become even more contaminated by toxic organics. An even greater number of warnings will be issued against human consumption of such fish and the livelihoods of many (commercial fishermen, recreational industries) will be affected. The health of people utilizing Great Lakes resources will be jeopardized as has the health of people at Love Canal, Montague, and western Lake Superior.

Without continued research, problems of inadequate waste disposal will not be addressed. Ground water will be contaminated and hazardous substances will continue to re-enter the atmosphere from inadequate land disposal sites and incineration techniques. These substances then will be dispersed over wider regions including the Great Lakes. Less expensive and safer waste disposal practices will not be developed and industrial costs will increase.

While there are a large number of regulations dealing with waste disposal, the success of such regulations depends on enforcement. Without research and surveillance on the Lakes, there there is little incentive to obey the laws. Already the region is troubled by various chemical companies using illegal dumping practices: abandoning toxic wastes in unmarked containers, night dumping into rivers, improper incineration. Without adequate research, the problem will only intensify.

Question 3b. In a best-case scenario, what will be the long-range benefits of continuing this research at the 1981 level?

The long-range benefits of continuing this research are that the Great Lakes will be effectively managed and maximum use will be made of their resources. Funding levels must, of course, increase with time to compensate for inflation and cannot remain at the 1981 level.

Industries will be able to utilize lake waters for cooling and food processing. Excessive algal blooms will not clog water intakes and waters will be relatively free from hazardous substances and noxious tastes. Furthermore, industry will have cost-effective ways of disposing of the hazardous wastes generated during manufacturing processes.

Farmers will be able to safely utilize large volumes of water for irrigation. These waters will be relatively pure and free from dangerous concentrations of toxic substances. Similarly, agricultural practices will be such that the Lakes are protected from excessive nutrients and hazardous substance loadings from agricultural areas.

The drainage basin will be an attractive area for people to live in or to visit. Great Lakes waters will be pure and suitable for municipal water supplies. The beaches will be free of decaying algae and fish. Sports fishermen will be able to catch and consume salmonids, perch, and walleyes: the commercial fisheries will remain viable. Recreational industries will benefit as people travel to the drainage basin to vacation near the Great Lakes coasts.

Should the need arise to divert Great Lakes waters to the more arid regions of the United States, these waters will be pure. Regions such as California and the Southwest, which already are limited by sufficient water for drinking and agriculture, may well require Great Lakes waters by the turn of the century.

With oil and gasoline prices increasing, it is possible that the Great Lakes shipping industry will have a greater role in transportation. Not only will ores, grains, and heavy machinery be shipped down the St. Lawrence Seaway, but also down the Mississippi River via Lake Michigan and the connecting shipping canals. Continuing research on the Lakes will allow the shipping industry to develop while protecting the environmental integrity of regions affected by shipping activities.

Question 3c. What do you see as the environmental problems and challenges of Great Lakes management in the 1980's?

The environmental problems and challenges to Great Lakes management have been eluded to at several points in the testimony and in this additional document. Accelerated eutrophication is a major environmental problem. Much has been accomplished in reducing this trend but the best information to date suggests that eutophication is continuing. Researchers must continue to deal with this problem by developing better methods for predicting the long-range effects of remedial actions and suggesting further actions for improving water quality. Cost benefit analyses must be conducted to determine the most effective ways of minimizing eutrophication.

Toxic substances pose a second major environmental problem. Researchers have learned that toxic substances are very persistent in the environment. Long times are required before contaminant levels decrease, even after inputs are reduced. It is highly preferable to avoid such problems rather than attempt to correct them after the damage has been done. With the myriad of new compounds that are synthesized each year, researchers face the challenge of predicting which substances have the potential to damage the environment. Scientists must be highly selective in the contaminants they select for detailed analysis: it is not economically feasible to conduct detailed studies (surveillance, ecological effects, etc.) on all the new compounds synthesized each year.

A third challenge focusses on redefining our concept of the Great Lakes. A hundred years ago, researchers studying lakes dealt only with the lake itself. In the middle part of this century, researchers became more and more aware of the importance of inputs from rivers, smaller tributaries, and runoff in affecting the chemical composition of water bodies. In the last ten years, the importance of atmospheric deposition has been recognized. Lakes are a part of a larger system including the drainage basin, activities conducted in the basin, and a world-wide atmospheric component. Scientists now have the challenge of working with this ecosystem concept in furthering our understanding of Lake function. Such an approach is essential to investigate how the Lakes and their drainage basins can be effectively managed for maximum protection and usage.

The fourth concept also relates to Lake management. With continued growth in human populations and the improvement in the quality of life, technological growth continues. Mankind has seen enormous benefits resulting from technology in the last few decades. The average person's diet is more varied and better balanced than at the beginning of the century. Improved drugs, medical practices, and sanitation have improved health and extended longevity. Day-to-day living is more convenient and society more mobile. If technology is to continue to develop, safeguards must be established so that benefits resulting from new technology are not offset by environmental damage. Researchers will be further challenged to improve the balance between between humans, technological growth, and the protection of the natural resources of the Great Lakes region.

Question 3d. What is your assessment (or others) of the quality of research conducted in the NOAA and EPA Great Lakes Laboratories?

Both the NOAA and EPA laboratories conduct excellent research which address the specific needs of the Great Lakes and further the general understanding of limnological systems. Scientists from both laboratories publish their research results in prestigious journals. Such publication requires extensive reviews by their peers in government laboratories and universities throughout the world. In addition, scientists from NOAA and EPA give scientific presentations at national and international conferences and workshops where their research results are well-received.

Results of research conducted by the NOAA and EPA laboratories have been used extensively by other scientists and lake managers. Predictive models developed by both laboratories were used extensively by the International Joint Commission in the renegotiation of the Water Quality Agreement of 1978. Based of their predictive models, new guidelines were set for target phosphorous loadings the Great Lakes. As a consequence of these new loadings, certain of the more eutrophic regions of the Great Lakes are showing promising signs of recovery. Scientists are both laboratories are conducting research whose results will have a major role in the formulation of the new Water Quality Agreement.

Question 4a. Do you have any idea how many jobs are connected with Great Lakes commerce?

It is difficult to state exactly how many jobs are related to Great Lakes commerce. However, a sense of the number is obtainable by considering commerce which directly or indirectly benefit from the Lakes.

A wide variety of industries utilize Great Lakes resources. The steel industries (e.g. U.S. Steel at Gary, Indiana), the automobile and heavy equipment industries (e.g. at Detroit, Flint, and Saginaw), the large number of chemical industries manufacturing paints, insecticides, herbicides, and fire extinguishers, all utilize Great Lakes resources. The mining industries (copper, iron) in Lake Superior and quarries (gypsum, salt, limestone, sand, clay, and gravel) located in Lakes Huron, Michigan, Erie, and Ontario also make significant use of Great Lakes resources. The forestry industry requires water for pulp and paper manufacture while the large number of power plants located on the Lakes use substantial volumes of water for condensor cooling. Agriculture makes extensive use of Great Lakes waters for irrigation. Furthermore, many food industries are located in the region and utilize these waters for processing and canning. The shipping industry directly serves these activities in addition to carrying products such as grain from the western part of the continent.

Much commerce is related to fish. The commercial fisheries, while not as valuable as in previous years, generate significant income to the Great Lakes drainage basin. The sports fishery is a major source of income and a significant part of the recreational industry. Marinas, restaurants, hotels, pleasure craft manufacturers, and fishing supply companies all benefit from tourism on the Great Lakes.

The Great Lakes drainage basin is an area of high population density and generally viewed as a desirable area in which to live. Some of the largest cities in the United States and Canada are located in this region. The large amounts of Great Lakes' waters which are suitable for municipal water supplies has been instrumental in the dense population growth of the region. Furthermore, the attractiveness of the area relates in part to many of the desirable features of the Great Lakes: clean beaches, fisheries, boating, parks, etc. Thus, many people working in the region are here because of Great Lakes resources without necessarily being directly engaged in Great Lakes commerce.

Question 4b. If the Great Lakes research activities that you have outlined in your testimony are cut or eliminated, what economic impact will this have on the Great Lakes area, either directly or indirectly?

The value of the Great Lakes as a resource will be reduced. Already the economy of the region has been damaged by environmental degradation. The native fisheries have been irreversibly altered and many of the fish currently inhabiting the Lakes are not safe for human consumption. Problems have been identified and remedial actions initiated. However, without continuing research, the problems will intensify. Much of the economy of the Great Lakes region is based on the intrinsic values of the Great Lakes. Industries requiring large volumes of water for cooling, and processing, and will not find the Great Lakes region a desirable location if the waters have a noxious taste, are contaminated by hazardous substances, or contain noxious blooms of algae which clog water intakes. Similarly, agricultural industries requiring large volumes of water will be less inclined to utilize contaminated Great Lakes resources.

The commercial fishery has suffered much economic hardship as a result of mismanagement of the Lakes. Continuing pollution of the Lakes will further impair this segment of the economy. While several millions of dollars have been invested in fish stocking programs, there will be no return of this investment if the fish cannot be harvested.

Continuing contamination of the Great Lakes will adversely affect the tourist industry. This is a major source of revenue (approximately 5 billion dollars each year) for the Great Lakes region and a probable area of further economic growth. In addition, with continuing environmental degradation, the region will become less desirable as an area in which people live. The region has a highly skilled populace trained in a variety of disciplines. However, such people will be less inclined to continue living in the region if they believe that their health is jeopardized by contaminated drinking water and fish, and if they cannot enjoy the natural resources of the region.

QUESTIONS FOR THE RECORD—NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

I. General Questions

1. Personnel cuts in the FY 1983 Budget

Q. a. How large are NOAA's proposed personnel cuts in the FY 1983 budget?

A. NOAA's total personnel cuts proposed for FY 1983 for Total Full-time Equivalency are -799.

Q. b. How have NOAA personnel levels changed over the past 5 to 10 years with respect to other government research and service agencies?

A. Beginning in FY 1974, when NOAA's personnel ceiling was 12,483, the trend moved slightly upward by 3.0 percent to 12,856 in FY 1980, then dropped by 7.2 percent by FY 1982, to 12,210 permanent FTE. The further proposed reduction in FY 1983, bringing NOAA's total permanent FTE ceiling to 11,447, represents a decrease of 8.3 percent from the FY 1974 level.

Other government research and service agencies have also been reduced in the last two years, but we are not aware of any agency that has been cut to a level below where it was ten years ago.

2. Research and Development

Q. We have received various estimates from NOAA about the size of proposed FY 1983 budget cuts on research and development in the agency. These estimates range from 30 to 45 percent.

a. What is your estimate of the size of the R&D cuts?

A. R&D cuts are approximately 41 percent of total NOAA program decreases.

b. Why did R&D assume such a disproportionately large share of the burden of cuts in FY 1983?

A. NOAA's primary mission is to provide service while conducting adequate research and development activities to maintain and improve those services. Consistent with the Administration's desire to reduce the level of Federal expenditures, budget reductions were necessary. In view of this we decided to reduce those areas which would have the least short-range impact on continuation of vital services. Approximately two-thirds of the reductions are grants. In some cases, these grant supported activities, such as in the Sea Grant Program, may be continued by state and local governments and the private sector.

3. Transfer of R&D into Operations

Q. There have been past criticisms of NOAA's basic research efforts in its Environmental Research Laboratories, not on the quality of the research, but in terms of inadequate transfer of research results and direct usefulness to NOAA's service missions.

a. What is your view of the goals of NOAA's research?

A. NOAA will continue to conduct an integrated program of research, technology development, and transfer. We will focus on those areas of research that offer promise of improving NOAA services in both the short and long range. Examples include research to improve weather observations and prediction, ocean observations and prediction, climate prediction, marine and atmospheric quality and marine resource development. We will continue research programs in the development of systems and components needed in improving methods of forecasting, detecting, and tracking weather systems and violent storms; air pollution; marine minerals; mapping, charting and marine description; conservation and protection of endangered and threatened species and fisheries; wave monitoring; and ocean engineering in response to national needs. Through structuring and redirecting resources, we expect to improve research productivity and transfer of technology to operational areas.

Q. b. Do you feel that enough is done to communicate research results, either to your own operations units (i.e. the Weather Service) or to other agencies or entities that might make use of your research?

A. We recognize a need to improve our technology transfer and have been working to improve communications through programs such as the Prototype Regional Forecasting and Observing Service (PROFS)--initiated in FY 1980. We have accelerated our efforts to identify existing technology and transfer it to operational units such as the National Weather Service and the Federal Aviation Administration. In addition, last year we initiated the development of a comprehensive five-year plan to improve the definition and application of research to operations. Once the plan is completed, it should help guide our efforts to identify problems in operational areas, develop the needed knowledge and technology, and improve our existing operations.

4. University Research

Q. The proposed budget would reduce support to universities for research and development from $28,250,000 to $7,010,000 in FY 1983.

a. Does this represent a reversal of the previous NOAA policy of increasing university-sponsored research relative to "in-house" research?

A. The reduction in support to universities does not represent a resersal of of the previous policy. The largest reduction is the elimination of the Sea Grant program. It is the Administration's position that the Sea Grant program has successfully established a network of university and private sector activities which should now be capable of continuing without Federal support. In-house research also is being reduced consistent with overall priorities.

Q. b. What are the implications of these trends in terms of the training of future oceanographers and meteorologists?

A. Since we expect that the Sea Grant network will continue under non-Federal and other Federal funding, there should be little effect on the training of oceanographers. Effects on the training of meteorologists should be small.

Q. c. What are the needs in your agency in terms of trained personnel? Are you able to attract enough talented scientists to carry out your programs effectively?

A. NOAA's largest needs have been for meteorologists and oceanographers. Generally, we have been able to attract an adequate number of personnel to meet out program needs. Since we believe that NOAA services and research provide exciting and rewarding career opportunities, we do not anticipate any difficulty in obtaining from university sources enough trained personnel to continue the required level of services and research.

5. Long-term Planning vs. FY 83 Budget Deliberations

Q. You have often stated that long-term planning is essential so that a sense of agency mission drives the budget process, rather than the other way around.

a. Your budget submission indicates that you believe NOAA has no mission in the Great Lakes, in solar-terrestrial research and in weather modification. Do you believe that NOAA has no mission in any of these areas? Which agency(s) does?

b. Did you consult with other agencies in developing these proposed reductions? Did the Office of Science and Technology Policy play a role in these deliberations?

A. (a) NOAA does have missions in the Great Lakes, solar-terrestrial research, and weather modification. Indeed, NOAA will continue to support basic programs to respond to NOAA's responsibilities in these areas that reflect careful assessment of priorities during a period of budgetary austerity and the contributions of related programs in other Federal agencies. Through the National Marine Pollution Program, NOAA insures that water quality in the Great Lakes is assessed through studies coordinated throughout the entire Federal Government. NOAA solar-terrestrial services can benefit from research sponsored by other Federal agencies with direct mission interests in solar-terrestrial relationships. In the case of weather modification, NOAA continues to conduct a program of fundamental atmospheric research that is necessary to understand the natural processes related to attempts to modify the weather.

(b) NOAA maintains a continuing dialogue with Federal agencies with atmospheric and oceanic responsibilities. Working level communication occurs spontaneously, and senior level communication is facilitated although the Federal Coordinating Council for Science, Engineering, and Technology. Budgetary priorities were established by each Federal agency in consultation with the Office of Management and Budget. The Office of Science and Technology Policy routinely reviews these budgetary decisions with a view to overall coordination of Federal programs in science and technology.

6. NOAA's Missions

Q. In view of the proposed budget cuts, what do you feel are NOAA's most important missions? What activities must we keep and what activities might be curtailed? What criteria will guide you in future years as you develop a plan and a set of missions for NOAA?

A. NOAA's missions continue to be to provide basic environmental services to the public, to conduct research necessary to improve the effectiveness of these services, and to implement the specific regulatory responsibilities assigned by the Congress. The budgetary process requires careful attention to priorities within overall fiscal policy guidance. NOAA's priorities must reflect the basic public requirements for the protection of life and property through essential oceanic and atmospheric services as well as opportunities for other agencies or governmental levels to contribute to the solution of oceanic and atmospheric problems of direct interest to them. The basic criteria for NOAA must be the maintenance of essential services and the fulfillment of direct statutory responsibilities.

7. National Policy on the Atmosphere

Q. You have mentioned several times the need for a National strategy on the atmosphere. Could you mention some of the components of such a policy and explain how it could be of use in protecting the atmosphere?

A. The Nation needs a coherent policy on the atmosphere to coordinate and focus research and service efforts on key needs and issues. Such a policy should include a strong emphasis on research relevant to improving our ability to predict atmospheric behavior, protecting environmental quality, and on services to protect life and property from severe weather events.

NOAA is developing a long-range plan for the agency that will include defining our role, objectives, and priorities in the atmospheric sciences. It will allow us to address major issues such as acid rain, the carbon dioxide build-up, stratospheric ozone depletion, and severe storm forecasting. NOAA's research in these areas is directed toward developing a fimer scientific basis for decision-making.

NOAA also has a leadership responsibility in atmospheric science efforts such as the National Climate Program, the National Acid Precipitation Assessment Program, and the Office of the Federal Coordinator for Meteorology.

These multi-agency programs involve integrated planning and coordination to ensure that crucial gaps and undesirable duplication are avoided. The interagency approach results in comprehensive programs addressing national concerns and enhances the Nation's return on federal expenditures.

8. User Fees

Q. Your budget contains several proposals for increasing collection of user fees for NOAA services.

a. For which of NOAA's services should increased fees be charged?

b. Who should be charged for weather data and services? For instance, would you make a distinction between private meteorological companies and the media (TV, radio, newspapers) in terms of user charges? Could charging the media lead to a decrease in use of weather information and concomitant threat to public safety and welfare?

A. (a) NOAA is pursuing established Federal policy that requires fees to cover the costs of products and services received by special beneficiaries. Accordingly, we are proposing increased fees for aeronautical and nautical charts and Landsat, and we are implementing increased fees for many of NOAA's climate, oceanic, and geophysical data products. We are also working with FAA on legislation (HR 2930) to cover our incremental costs of providing aviation weather. These revenues might ultimately be viewed as user fees since FAA, as primary distributor of the services, will make its collection from aviation users.

(b) NOAA has reviewed weather data and service programs against the established Federal policy of assessing fees to special beneficiaries. The overwhelming majority of weather programs benefit the general public and as such fall outside this user fees criterion. Aviation weather, as discussed above, is a special beneficiary program for which we are proposing a form of user fees. Other special beneficiary programs in the weather area are generally being eliminated in FY 83. NOAA will continue to make weather data available to private meteorological companies that provide their own receiving equipment and pay line charge for data transmission. While these companies are special beneficiaries, NOAA's incremental costs of opening our circuits to allow them to tap in is minimal and is outweighed by the administrative costs of instituting user fees to recover.

If NOAA were to consider user fees for general weather data and services in the future, such fees would almost certainly apply to both the media and to private meteorological companies in the interests of equity and efficient allocation of resources. Both of these routes play an important role in reaching the public. The impact upon public safety and welfare would certainly weigh heavily in any future consideration of user fees to be paid by the media, private meteorologists, or any other method of dissemination made for public weather.

NOAA presently has no solid evidence of the impact of price upon demand for weather data and services. The only indication we have, from a National Research Council study, is that the media regards weather information as a major attraction to their public. Radio and TV spend a minimum of $1.5 billion annually (measured in terms of air-time value) on weather. This figure is five or six times greater than NOAA's annual expenditures on weather services. However, we do not know how the media's current expenditures on weather compare to the advertising value of weather. It may turn out that the advertising value is already very close to the expenditure level and that further costs, resulting from user fees, could not be supported.

9. User Fees

Q. You have proposed increased user fees in FY 1983 for aeronautical and nautical charts, for aviation weather, and for LANDSAT data.

a. When will you submit proposed legislation dealing with these issues?

b. Do the totals for your FY 1983 budget assume that these bills will be passed during the 97th Congress?

c. Please describe these proposals in details with reference to:

-- Scope of legislation
-- Revenue projections for FY 1983 and beyond for each proposal
-- The possibility of the private sector displacing the more expensive government service (for instance, private companies already produce alternatives to government aeronautical charts)

A. (a) Proposed legislation for aeronautical and nautical charting was submitted to Congress on April 2, 1982. Proposed legislation for Landsat was originally submitted May 5, 1981, and amended by letter dated March 1, 1982. As noted earlier, we are supporting HR 2930 which will allow the FAA additional resources to support its programs, including aviation weather.

(b) Our FY 83 budget figures are predicated upon increased user fee revenues and, therefore, assume passage of the requisite legislation.

(c) In summary, the proposed charting user fee legislation would (1) authorize recovery of the full production and distribution costs of nautical and aeronautical charts; (2) provide for the deposit of fee revenues in Miscellaneous Receipts at Treasury; (3) provide copyright authority for charts; and (4) provide for advance reimbursement from other Federal agencies for charts. The Landsat proposal, in summary, would (1) transfer the planning, management, and operation of Landsat from NASA to NOAA; (2) provide for user fees; (3) initiate a formal planning process for the future transfer of the Landsat system to the private sector; and (4) authorize appropriations for FY 82 and FY 83.

Revenue projections, in millions, are:

	FY 83	FY 84	FY 85
Nautical and aeronautical charts	$42.3	$63.4	$87.9
Landsat products	$25.0	unknown	unknown

Both sets of projects include payments from Federal and non-Federal users. The revenues projected for charting in all three fiscal years assume constant chart sales at FY 82 levels. Projected chart revenues for FY 85 will recover 100% of projected costs that year. The revenues for Landsat would be collected during the eight months of FY 83 that NOAA anticipates being the Landsat operator and would recover 100% of the projected operating costs for that period. Revenue projections for the out years of the Landsat program have not been made because of program-cost uncertainties, but full cost recovery remains the objective.

If HR 2930 is enacted, the transfer of funds from FAA is expected to be approximately $27 million in FY 83 which would cover the full incremental costs of those services. The amount, except for adjustment for inflation, would remain constant in subsequent years.

There is the possibility that the private sector would displace NOAA services in certain of these programs areas. Such displacement is hoped for, wherever the public can obtain comparable services at less cost. In the Landsat program, private sector takeover is an explicit NOAA objective. However, at present, NOAA is not aware of any significant productivity advantages held by private firms in any of these programs areas that would enable them to produce products of equal quality at lower prices.

II. Questions on the National Weather Service

1. Closure of 45 Weather Service Offices

Q. On February 8, the Administration's FY 83 budget was released with the proposal to close 45 Weather Servicd Offices nationwide, and to eliminate or cut back on specialized services to agriculture, aviation, and forestry. Less than three weeks later, the Admininistration reversed its decision and announced that the 45 WSO's would not be closed.

a. What caused the reversal of this decision?
b. Why has the Administration continued to insist on termination of specialized services to agriculture and forestry?
c. Why will the Administration close 18 part-time WSO's in April of 1982 in light of the decision to "re-open" 20 other part-time stations?

A. a. Because of the concern expressed by Congress and the public over the adequacy of the local forecast and warning services that will be provided to the immediate area now served by the Weather Service Offices identified to be closed, the Department of Commerce agreed the proposal should receive additional review. In this regard, the proposal was rescinded.

b. An essential ingredient in the formulation of the Administration's budget proposals is the reduction of Federal expenditures and employment where possible and appropriate. First, the "core" mission is identified and preserved. In the National Weather Service, this is the basic warning

DEPARTMENT OF COMMERCE
NOTIFICATION OF PROPOSED REPROGRAMMING
FY 1982

Operating Unit:	National Oceanic and Atmospheric Administration
Appropriation:	Operations, Research and Facilities
Project:	Closure of Weather Service Offices (WSOs) and Conversion of Weather Service Forecast Offices (WSFOs) to WSOs.

FISCAL SUMMARY
(Amount in Thousands)

	Perm. Pos.	Amount
1. Reprogrammed from:		
Hurricane and Tornado Warning Services.............	0	-450
2. Reprogrammed to:		
Support 38 Weather Service Offices and maintain current status of 4 Weather Service Forecast Offices..................................	0	+450

DESCRIPTION/JUSTIFICATION

NOAA proposes to reprogram $450,000 from Hurricane and Tornado Warning Services to continue the operation of 38 part-time weather stations (WSOs) and to maintain the existing status of 4 Weather Service Forecast Offices (WSFOs) through June 20, 1982.

This reprogramming is required to fund an extension of the operations of the 38 part-time stations and maintain the existing status of the 4 Weather Service Forecast Offices (WSFOs) while appropriate personnel actions and proper employee notifications are undertaken, preliminary to the closing of these stations and downgrading of the 4 WSFOs. These actions have been necessitated by the April 2, 1982, disapproval of a requested reprogramming, which would have extended the operation of 20 of the 38 stations and maintained the status of the 4 WSFOs for the remainder of the fiscal year. Funding for operation of these stations, as provided in the FY 1982 Continuing Resolution (P.L.97-92 and P.L.97-161) is insufficient to meet operating expenses for the period through May 31, 1982. This time is required to effect an orderly resolution of the station closures and downgradings.

The $450,000 reduction in hurricane and winter storm reconnaissance support will decrease the number of reconnaissance flight hours by 18 percent, from an average of 1,453 hours to 1,191 hours, equivalent to 21 missions. This should still allow for sufficient flight hours to handle projected requirements.

EFFECTS

This is a one-time, temporary action affecting only FY 1982 funds.

and attendant forecast programs designed to protect the public. Then, the remaining programs are assessed to determine the degree to which they provide services to a specific user group, and if these services would be more appropriately provided by the private sector or funded through user fees. The agricultural weather program, including the fruit frost service, provides services to specific user groups. It is proposed that these services could be provided by private meteorologists and would be more appropriately funded by the users rather than the general public. General, public weather warnings and forecasts would still be available to these users and others. That portion of the fire weather program not relating to protection of life was eliminated as being of a lower overall priority.

c. The attached reprogramming notice explains this issue.

Q. What is your long-range plan regarding closure of weather stations? Do you have such a plan? Do you think that local weather stations will eventually not be needed because of automation, or will we always need a network of local stations?

A. With the introduction of new technology into weather service operations in the next decade, we expect to provide substantially improved forecast and warning services to the public, with a corresponding reduction in loss of life and property due to adverse weather. In order to make most effective use of this new technology, it may be desirable to change our field organization structure as we proceed to operational status with new equipment. As part of this planning, we have been looking at various alternative configurations of our field offices. However, this is all in a preliminary stage and no decisions have been made as to closure or relocation of existing field offices.

Automation will take over most of the manual observation and communication functions, allowing personnel to devote more time to work with county and city officials in planning disaster preparedness activities, ensuring rapid dissemination of warnings, and cooperating with local news media in raising public awareness of protective measures that can be taken against adverse weather.

Q. How many local stations will be needed in 1985? In 1990? When the Weather Service achieves automation of communications and data-collection?

A. As noted above, we are not now in a position to say how many local stations will be needed in 1985 or 1990. It is clear that automation of communication and data-collection will change the role of local stations, as indicated in the answers to the previous question. This changed role will require a new appraisal of how many small, local stations will be required.

2. Delayed automation of Weather Services

Q. a. What impact do you think that budget reductions will have on NOAA's long-range efforts to modernize and automate its systems to meet is responsibilities in protecting life and property?

A. Budget restrictions will slow down some modernization efforts and stretch out the period during which we will operate in a labor intensive mode with older equipment.

Q. 2.b. What impact will the delay in automating services have on NOAA's long-range plan to centralize and consolidate its Weather Service Offices? What is NOAA's long-range plan to centralize and consolidate its weather offices?

A. Since our plans to reorganize the field office structure are dependent upon availability of automated and modernized equipment, any delays in this area will postpone our program to reorganize the field structure. It is somewhat misleading to refer to these plans as leading to centralized and consolidated weather service offices. On the one hand, there will be some consolidation of forecast and warning functions from small part-time offices to larger full-time offices, but on the other hand, there will be an expansion and decentralization of our basic state forecast network to an average of 2-3 forecast and warning offices per state. This will provide more professional service closer to the public and concentrated on a smaller area for each station.

3. Agricultural Weather Service

Q. You are proposing to eliminate agricultural weather services--$1.2 million. We had a number of witnesses testify in February, 1982, that this proposed cut is poorly conceived. Please comment on these aspects of their testimony.

- ° That little will be saved by NOAA's termination of this program since public and political pressure will force the Department of Agriculture to start an Agriculture Weather Service?
- ° That transferral of agricultural weather service to the private sector lacks NOAA's well developed communications system?

A. In response to the overall effort to reduce Federal employment and expenditures, NOAA identified programs for elimination that could be more appropriately funded by user fees and programs that provide services to a specific user group which could be provided by the private sector. The Agricultural Weather Program provides services to a specific user group. It is proposed that these services could be provided by private meteorologists.

General, public weather services provided by the National Weather Service across the country will still be available to the farming community. These offices provide weather warnings and forecasts which are made available to mass media and others by NOAA Weather Wire Service and through broadcasts over NOAA Weather Radio. Applied weather services to meet any special or specified needs of the farming community are available from the private meteorological industry. These services include the prompt communication of information to the client.

4. NEXRAD (Next Generation Weather Radar)

Q. a. In light of budget reductions in the NEXRAD program, what is your current estimate of the date of deployment of the new system?

A. The proposed budget reductions will reduce efforts planned for the validation phase during fiscal years 1983-84 and could delay initial deployment of the NEXRAD system until 1990 and final deployment until 1994. The current acquisition approach for implementation of the NEXRAD system calls for full production and deployment to begin in 1987. This schedule is important because current weather radar systems, which NEXRAD is designed to replace, are typically more than 20 years old.

The NEXRAD program is now in the system definition phase. Three competitive contractors will develop system designs, perform tradeoff studies, identify risk areas, and estimate acquisition and life cycle costs. During the validation phase (1983-1985), one or two of these contractors will refine the design and development process, including development and testing of prototype systems and subsystems where needed for reduction of risk. During the following full scale development phase (1985-1987), design and development will be completed and a limited number of preproduction systems built, tested, and installed. During the final production phase (1987-1991), remaining NEXRAD systems will be built and deployed at designated locations.

Q. 4.b. Will the ultimate system contain a mix of Doppler and non-Doppler radars?

A. The House Committee on Science and Technology requested that NOAA prepare a cost-benefit comparison of the proposed NEXRAD system and a system of non-Doppler coherrent radars. Reliable cost data must be obtained before this analysis can be made. A cost-benefit analysis using results from contractor system definition phase studies will be completed by August 1983. This analysis will be a key factor in determining whether the proposed system should be all Doppler or a combination of Doppler and non-Doppler radars. Until the system definition phase studies have been completed and the resulting information on design, requirements, maintenance, and cost is available, a decision on whether the ultimate system will contain a mix of Doppler and non-Doppler radars will be deferred.

Q. 4.c. What is the current projection for the total number and cost of radar units in the NEXRAD program?

A. The total number of proposed radar units in the NEXRAD program is 160. This includes 139 operational sites in the conterminous United States, 16 DOD overseas locations, and 5 support radars. The preliminary estimate of acquisition cost for 160 Doppler systems is $860 million. Results of the system definition phase studies will provide updated cost information for each production unit.

Q. 4.d. Do you envision an increase in use of Doppler radar sets by private TV stations? (Two are already in operation) If so, do you see any problems of conflict between forecasts and warnings issued by these stations and those provided by the Weather Service? How would you resolve these conflicts?

A. Because of the competitive nature of the private TV industry, an increase in use of Doppler radar by private TV stations can be expected. This expansion is most likely to occur in areas with a high frequency of severe weather occurrence and a correspondingly high public interest in severe weather.

There may be conflicts between forecasts issued by these stations and the National Weather Service because of different interpretations. The state of the science is such that two meteorologists assessing a given weather situation may arrive at differing forecast conclusions. With regard to warnings, it is our position that the issuance of warnings to the general public is clearly a responsibility of the Federal government because of the intrinsic responsibility to provide for the safety of the general public. In cases of severe weather conditions that are an immediate threat to life and observed property, such as a tornado, the National Weather Service encourages notification of the public by any responsible source, with NWS coordination as soon as possible.

Conflicts can be avoided by continuing the ongoing cooperative relationship the National Weather Service has with the media and private meteorologists. This provides means for addressing and resolving issues.

5. Consolidation of Military and Civilian Weather Services

Q. Several witnesses testified in February 1982 that considerable savings might be achieved by consolidation of civilian and military meteorological efforts.

a. Is the Administration currently examining this option? If not, why not?

A. In recent years there have been numerous studies and hearings by Congress, Federal agencies themselves, and studies by the Office of the Federal Coordinator. We believe the subject of providing weather services to the general public, specialized users, and the military has been thoroughly examined.

Q. 5. b. Do you believe that such consolidation of weather services could lead to efficiency and reduction of budget deficits?

A. Government agencies have a vital stake in weather activities for several reasons. They may be legally responsible for providing weather service, as the Department of Commerce is; they may require weather service to carry out their own missions; or they may be legally responsible for developing unique technology which contributes to the improvement of weather services, such as the NASA effort in the meteorological satellite area.

The Department of Defense operates a military environmental service system to provide specialized worldwide meteorological and oceanographic prediction services in support of military forces.

Under the guidelines of Office of Management and Budget Circular A-62, the mission of the Office of the Federal Coordinator is to promote coordination and cooperation among the various Federal weather agencies so that the best weather information is available to users at least cost. This is being pursued in a reasonable manner with notable economies.

In our attempts to eliminate duplication and to reduce budget deficits, we must be careful not to encroach on the Department of Defense's operational mission support responsibilities both overseas and in the continental United States. While security considerations should not automatically exclude mutual support of basic weather services, the ability to respond and to direct military operations, in peacetime as well as wartime, cannot be compromised.

6. Number of Trained Weather Personnel

Q. Your goal in Weather Service seems to be to bring more powerful technology (satellite data, computers, integration of radar and satellite data) into the local stations.

a. If these offices are to serve a more active role in local weather forecasting, does NOAA expect a shortfall of trained meteorologists to man these local stations?

A. We do not expect a shortage of trained meteorologists since the universities are producing a more than adequate supply and there are no indications that this supply will dwindle. Moreover, the changeover to a new field organization will take place over a period of years with plenty of time to adjust to new personnel requirements as well as retraining of existing sub-professionals.

Q. 6. b. What are you doing to insure an adequate supply of trained meteorologists for the Weather Service of the future?

A. As indicated above, we believe that the basic supply of university trained meteorologists will be more than adequate to meet our needs. In order to make most effective utilization of existing technicians, we plan on making training available to all who are interested so that they can qualify as trained meteorologists. The combination of these two sources should satisfy our requirements for the foreseeable future.

III. Questions on Weather Satellites and Satellite Policy

1. Proposed Elimination of one-Polar-Orbiting Weather Satellite

Q. For FY 1983, NOAA has proposed downgrading the polar-orbiting weather satellite system from a two-satellite to a one-satellite system.

a. What is your estimate of the impact of this proposed reduction on weather forecasting? Specifically on weather forecasting over the oceans, in the Southern Hemisphere, and over the West Coast of the U.S.

A. Without having had experiments to verify this, we estimate that the proposed reduction of the polar-orbiting satellite system from two satellites to one will cause only a small degradation in the skill of forecasts averaged over a season or a year. The effect would likely be near negligible in the Northern Hemisphere, and probably less than ten percent in the Southern Hemisphere.

There are two important qualifications with this estimate:

There are occasions each year in the winter hemisphere when cyclones develop with unusual speed into intense major storms. When these developments occur over the oceans, there is a significantly greater likelihood that they will be inadequately observed with one satellite than with two. Such events happen rarely and tend not to be noticeable in annual averages of forecast skill, but when they do occur, it is important to forecast them accurately. The impact of such missed forecasts would be felt mainly in the western U.S.

A single satellite system is vulnerable to the failure of the satellite. Without backup, the effect on weather forecasting could be immediate. Forecasts over the Southern Hemisphere and Northern Hemisphere oceans for even short periods in advance--a day or so--would be degraded. The accuracy of medium range forecasts--three to ten days--over much of the United States would be diminished.

Q. 1. b. What does your past experience show regarding the usefulness of a two-satellite vs. a one-satellite system?

A. We have not been able to perform controlled experiments to investigate questions such as the benefits of one polar-orbiting satellite versus two. Such experiments are consumptive of computer and personnel resources, for they require a period of dual operation--one real, one experimental--which differ only with respect to the aspect being tested.

Q. 1. c. Let us assume that flying two satellites does improve 3 to 5 day weather forecasting significantly. What is your estimate (to agriculture, the building industry, water management, forestry, public utilities, fishing, and the general public) of the economic value of enhanced 3 to 5 day forecasts? Have you made such an estimate? If not, why not? Would it not make sense, before proposing to terminate a satellite, to examine the cost-benefit calculus of such a proposal?

A. Studies of the impact of improved forecasts for agriculture, aviation, and snow-removal, where large and quantifiable potential economic payoffs exist, point to benefits larger than the program costs. In isolating a specific benefit within a large program area as in the one versus two-satellite question within the overall framework of weather forecast accuracy, results of a cost-benefit study would probably be inconclusive. We have evidence that the three to five day forecasts are useful to utility companies where storage problems exist and gas rates are discounted for longer lead times between orders and deliveries. For example, the Washington Gas Light Company estimated savings of several million dollars in 1981 through judicious use of forecasts in managing their supplies and storage facilities.

The Waialua Sugar Company (on Oahu Island in the State of Hawaii) has estimated that accurate scheduling of harvest activities has resulted in savings of $1,000,000 per year. Sugar cane that is ready for harvest must be burned and then gathered within a two to three day period. The need is to be able to schedule this harvesting to conform to air regulations and to avoid stoppage due to rain that would result in spoilage of ungathered cane.

Shipping operations in the Great Lakes, St. Lawrence Seaway, and the Artic have benefited from polar-orbiter observations of ice conditions. It is possible to see the present extent of ice in such areas and to spot trends that are likely to persist for several days. The U.S. Military Sea Lift

Command has estimated savings of $8,000 per day for each day of Artic operations resulting from the knowledge of conditions gained from satellite imagery. The satellite observations have eliminated the need for visual reconnaissance missions to gather ice condition information producing cost reductions of about $5,000,000 annually.

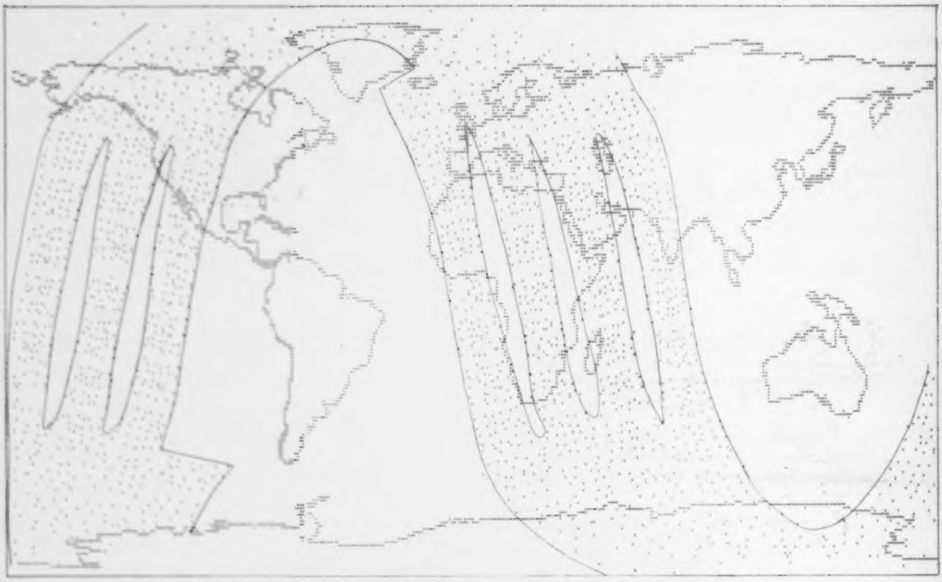
Sea surface temperature analyses for West Coast waters are made using the precise observations from the polar-orbiting satellites. Trends persisting for several days are estimated from a sequence of such images with benefit to the fishing industry. Estimates of annual savings to the West Coast fishing industry of about $2,500,000 have been made.

The use of one versus two orbiting weather satellites could have an impact on the aviation industry using the shorter-range global forecasts. We know that improved wind forecasts can reflect savings in fuel costs ($80-$160M per year).

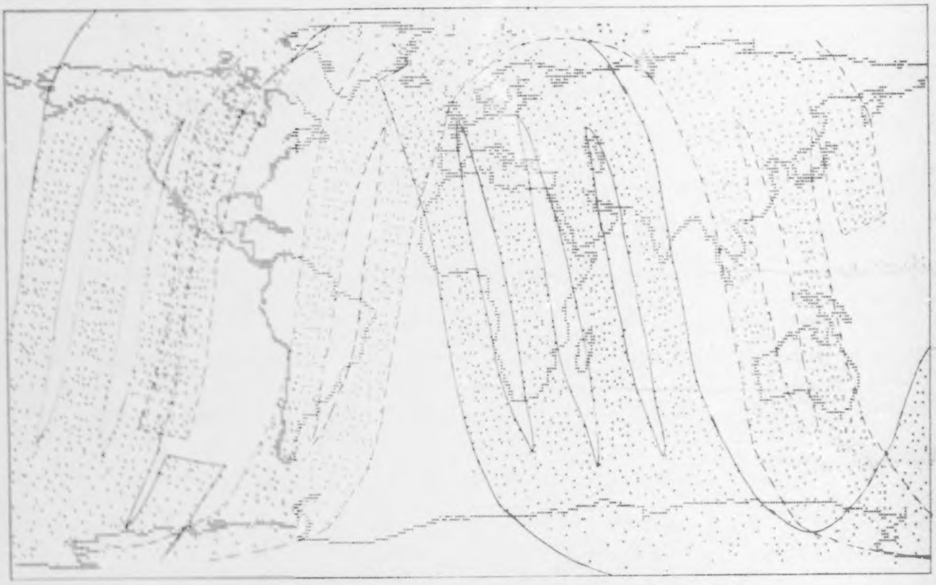
1. d. Do you agree with the following statements?

Q. A one-spacecraft system would not provide continuous coverage in tropical latitudes.

A. Yes, with only one polar spacecraft there will be approximately 10-15 percent of the equatorial belt, from 35°N to 35°S latitude, which cannot be usefully observed. The four maps attached show the usable area of temperature soundings provided by one versus two polar spacecraft for the two major synoptic map times, i.e., 00 or midnight Greenwich time and 12 or noon Greenwich time. Soundings three hours before and after those times are usable in the NWS computer model.



ONE-POLAR SOUNDINGS
FOR 12Z MAP



TWO-POLAR SOUNDINGS
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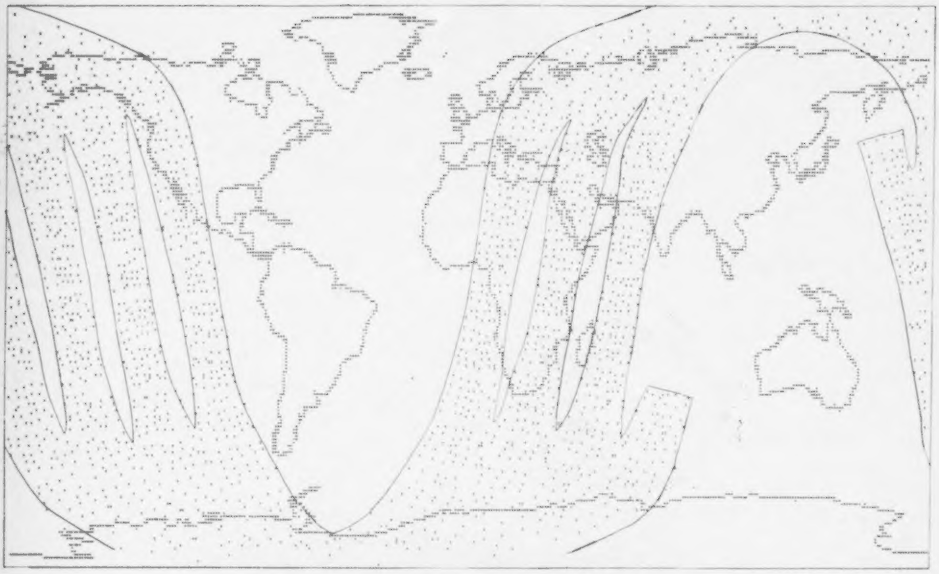
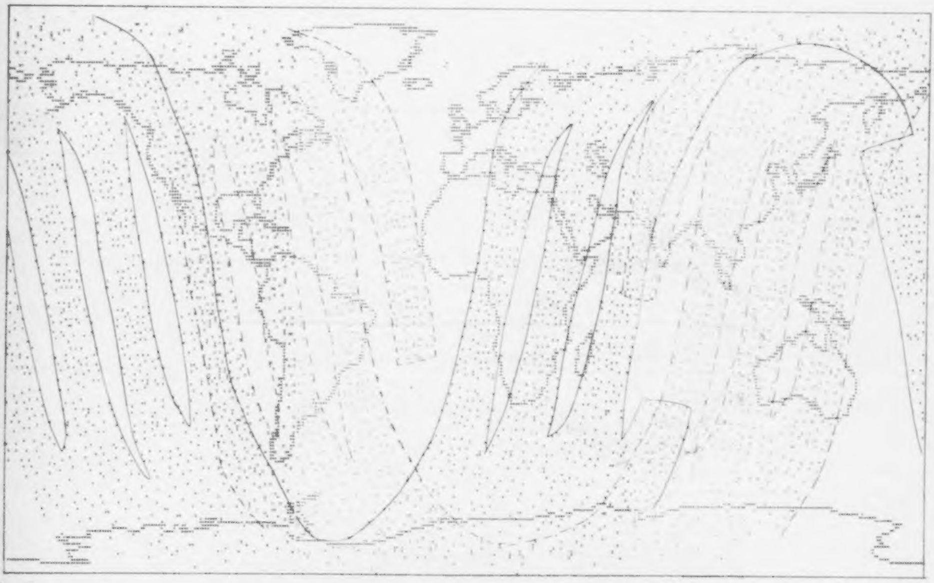


ONE-POLAR SOUNDINGS
FOR 00Z MAP



TWO-POLAR SOUNDINGS
FOR 00Z MAP

1. d.

Q. The National Meteorologial Center is now almost totally dependent upon satellite data from large areas of the globe for its forecast model.

A. Yes, data coverage charts for any day clearly indicate the dominance of satellite-derived data over the world's oceans. Global forecasts and forecasts out to ten days depend upon data from orbiting satellites.

1. d.

Q. NMC's "limited fine mesh" model requires data from both polar satellites to reach full accuracy.

A. No. NMC's Limited-Area Fine-Mesh Prediction Model does not require data from two satellites to achieve full accuracy. One satellite, with properly-timed orbit, and with more rapid processing capability, would suffice for the one to two day forecasts over the conterminous 48 States produced by the LFM.

1. d.

Q. Reduction to a one-polar system would harm the effectiveness of the following missions:

-- Agristars, a joint program aimed at providing improved commodity production forecasts for the major agricultural areas worldwide.

A. A one-satellite system would harm the effectiveness of AgRISTARS since this program depends on continuous data from regions of the world where little precipitation and temperature data are taken and exchanged internationally (tropics and Southern Hemisphere). One satellite will not adequately specify the diurnal variations of cloudiness and precipitation. Geostationary satellite coverage would be the most desirable for AgRISTARS but this is unavailable over most of the important areas.

Q. -- The global cloud climatology program of the World Climate Program

A. Reduction to a one-polar system would effect the global cloud climatology project of the World Climate Program. The global cloud climatology project is based on a coordinated observational program utilizing polar orbiting satellites and the geostationary meteorological satellite systems. Reduction to a one-satellite system would degrade coverage in high latitudes so that diurnal cloud variations could not be observed adequately. The polar orbiting satellite data would be utilized for intergeostationary satellite calibration task except during gaps due to system failure.

Q. -- A search and rescue mission designed to save lives of persons involved in aircraft or boating accidents

A. The search and rescue demonstration was planned to begin in mid-1982 with the launch of NOAA E which would have replaced NOAA 6 which was launched in June 1979. The U.S. user agencies are expected to be ready to support the demonstration at that time; staff and equipment will be in place waiting for the flow of data to begin. The NOAA E launch delay from mid-1982 to early 1983 will not, in itself, significantly affect the program's initial goals.

1. e.

Q. NOAA currently provides satellite data to over 120 nations of the world, either via automatic picture transmission (APT) or via the global telecommunications system. What impact will termination of one-polar satellite have on:

-- Weather forecasting worldwide?

A. Effects of reduction to a single polar orbiting system will be felt by other nations through the reduction of global data available via the GTS for numerical prediction and through a reduction in the frequency with which polar-orbiting imager--e.g., APT pictures--is available for short-range weather forecasts. Major impact would be upon nations in the Southern Hemisphere. Countries with sophisticated numerical prediction capabilities, e.g., Canada, the United States, Great Britain, Australia, and nations not covered by or not equipped to receive photos from geostationary satellites, will produce less accurate forecasts in this Southern Hemisphere regions.

Q. -- Our relations with nations of the third world

A. Third world nations exist predominately in lower latitude portions of the earth where weather changes are of an air mass variety. High and low pressure regions and storm fronts typify the weather of the mid-latitudes, but are largely absent in the third world. The low latitude weather changes little from day to day. The forecast problem usually is one of determining where and when the afternoon rains will occur. The four-times-a-day APT cloud cover pictures obtainable from a two-polar system provide excellent information on which to establish a weather forecast service in a third world country. A one-polar system would provide APT views of cloud formations only twice per day.

1. e.

Q. Have you consulted with other nations regarding sharing the costs of operating a two-satellite system?

A. Preliminary discussions are underway through the World Meteorological Organization on an international meteorological satellite system. We are also beginning bilateral discussions with other nations to explore alternatives, including possible joint funding of a U.S. satellite or the development of a foreign-owned satellite providing complementary data services. Response to these discussions cannot be predicted at this time.

Q. 1. f. It has come to our attention that since the cancellation of the National Ocean Satellite System (NOSS) in 1981, NOAA has had NASA investigating the feasibility of carrying ocean sensors on the polar satellites. If the polar satellite program is reduced, is it true that such an oceanographic program would be delayed until the end of the decade?

A. At NOAA's request, NASA has examined the technical feasibility of flying the Coastal Zone Color Scanner (the CZCS of our existing design) or a scatterometer (new design) on the TIROS-N spacecraft. The conclusion is that either of these two sensors could be added without changing the basic complement of sensors on the spacecraft. Both ocean sensors could not be accommodated without eliminating the basic weather sensors. NOAA, DOD, and NASA are now exploring further ocean remote sensing alternatives.

Reduction of the polar orbiter program from a two-satellite system to a one-satellite system would reduce the opportunities to fly sensors such as the CZCS, scatterometer, Earth Radiation Budget Experiment, and the Search and Rescue package. New trade-off studies will have to be made to select among this candidate list. It does not necessarily follow that the conversion to a one-satellite would preclude the addition of ocean remote sensing capabilities until the end of the decade. Such a capability might be considered a higher priority than other possible users of the satellite's capacity. It would, however, require about six years to obtain the funding and contract for modifications to the spacecraft bus to carry an "off-the-shelf" instrument such as the CZCS. Development of a new scatterometer would take longer. Thus, even limited ocean remote sensing capabilities on a NOAA polar orbiter would not be possible before about 1988, even under a two-satellite system.

2. Transfer of Weather Satellites to the Private Sector

Q. COMSAT testified in February, 1982, before the Subcommittee regarding its proposal to operate civilian meteorological satellites. COMSAT claims that it could provide the same satellite services that you presently provide, but at a lower cost, and that it would develop markets for weather satellite data that are currently untapped.

a. What is the status of the review of transfer of weather satellites to the private sector by the Cabinet Council on Commerce and Trade? When may we expect a decision?

A. The Cabinet Council on Commerce and Trade (CCCT) is considering the national security and international concerns related to the transfer of the civil weather satellites to the private sector either alone or in combination with Landsat system. A decision is expected soon.

Q. 2. b. Specifically, what are the national security problems in international aspects of this program which might make it unwise to proceed with commercialization at this time? How you view these concerns? Specifically,

-- Are there linkages between civil weather satellites and civil and military weather services that could be disrupted to the detriment of the nation?

A. The civil weather satellites provide essential services to the military weather services. The polar orbiters provide back-up to military systems. Civil data are used in military forecasting centers and in field activities. The geostationary satellites provide certain unique capabilities not incorporated in military weather satellite systems. Civil and military ground data processing systems are now interlocked, and will be even more so as the joint NOAA/USAF/USN plan for shared data processing of data from civil and military satellites is fully implemented. Disruptioin of these linkages could be detrimental to military activities, as well as to civil weather prediction services. There is reason to believe that protecting these civil-military linkages, in combination with protecting the linkages between the United

States and weather services in other nations, will limit private sector opportunities to commercialize the civil weather satellites over the next decade.

Q. -- Doesn't the private sector (COMSAT) already provide maritime data to the Navy today? Is that situation analogous to the provision of weather services to the military by the private sector?

A. COMSAT does no environmental remote sensing from space. It provides communication service for the Navy, relaying maritime data through the MARISAT satellite. Many companies have the capability of relaying environmental data via satellites. Designing, building, and operating environmental remote sensing satellites is not analogous to operating communication satellites. Several companies (Hughes, RCA, GE, Ford, etc.) have experience under government service contracts in the remote sensing field. None have experience in providing contracts in the remote sensing data services to either civil or military users.

Q. 2. c. Administration reviews in both 1972 and 1978 concluded that the nation should maintain independent military and civilian meteorological satellite systems. If this is so, why would the transfer of meteorological satellites to the private sector present national safety problems?

A. Civil and military polar orbiting satellite sytems are under separate management, but they are closely coordinated and coupled as discussed under question III.2.b. The government's civil programs are under a policy direction of the President and thus can be controlled to accomodate national security concerns and responsiveness to military requirements, usually without additional impacts on either civil or military budgets. Without enforceable contract provisions, or specific legislative authority a private operator would not be bound by Administration policies or concerns. It is also possible that these national security concerns and military uses of civil data would result in higher charges to the government for private sector services: charges that would be passed to the military budgets. Hopefully these charges could be avoided in contract negotiations, but this is not a certainty.

Q. 2. d. Do you agree with COMSAT's analysis that it could save the government considerable resources by operating the meteorological satellite program out of the private sector? Who in the Administration is analyzing the economic aspects of this program?

A. The COMSAT proposal addresses the simultaneous takeover of both the land and meteorological satellite programs. The company has presented no figures on costs to operate the civil weather satellites alone, so the first question cannot be answered. Reductions in government costs, if there are any, from COMSAT's proposition appear to be in the costs related to land remote sensing (see question III.2.e.). The only adequate method of determining government versus industry costs to operate the civil weather satellites is through the process delineated in OMB Circular A-76 where industry and government costs are determined on a competitive basis. We expect that this A-76 process will be conducted if the CCCT so directs. The process may take up to two years once it is started.

Q. 2. e. Do you feel that potential transfer of meteorological satellites and of Landsat to the private sector are issues that should be resolved separately? If so, why? Under what conditions would you transfer the weather and land satellites to the private sector?

A. This Administration and the previous one agreed that it is in the public interest to transfer the Landsat system to the private sector. The land and weather systems are quite different in operational and technical characteristics, and the user community they serve.

The weather satellites serve a well established user community. Ninty-five percent or more of the data is used almost exclusively by the government. There appears to be little opportunity for commercial exploitation of the data services either domestically or internationally because of the public services of providing weather forecasts for the protection of life and property.

Landsat, on the other hand, has a large, diverse number of users, with government use today accounting for around half the data sold. There is a large potential commercial market for data and derived "value added" service to the non-renewable resources industry and the global trading of agricultural products.

Decisions on when and what conditions to transfer either satellite systems should be based on the merits of the transfer, and on the present and future cost impacts to the government.

3. Shuttle Launch of Weather Satellites

Q. It has been contended that a way to effect substantial savings in the weather satellite program without damaging its fundamental character would be to reverse the Executive Branch decision that weather satellites must be launched by the Shuttle when it becomes available.

a. Could you please elaborate on the directive that requires launch of weather satellites by the shuttle?

A. At the present time there is no written directive requiring that satellites be launched on the shuttle. The President has stated that the shuttle will be the primary means of launching satellites for the United States. Furthermore, NASA has planned to phase out Expendable Launch Vehicle (ELV) production once the shuttle system becomes fully operational and capable of supporting all users' launch requirements. As part of the current Office of Science and Technology Policy (OSTP) Space Policy review, one of the issues being addressed is that of whether any ELV's will be continued as back-up to the shuttle. This part of the study is being led by NASA with participation of DOD, NOAA, OSTP, and OMB.

Q. b. What are the cost comparisons between launching of weather satellites by an expendable vehicle rather than adapting the satellites for shuttle launch?

A. Cost comparisons have been performed for both geostationary and polar-orbiting METSATS. In the case of the geostationary satellites, which are launched from the Kennedy Space Center in Florida, there is an official pricing policy, thus permitting accurate comparisons. For the GOES satellites, the comparison shows that because there are adequate opportunities for sharing shuttle launches, the cost of launching on shuttle is competitive with the cost of launching on Expendable Launch Vehicles (ELV's).

With respect to the polar-orbiting satellites, which must be launched from California, NASA has not announced an official pricing policy, giving the reason that so far there are no nongovernment satellites proposed for launch from this facility. Our cost comparisons were therefore based on NASA estimates prepared during the definition phase for the NOAA H, I, and J satellite procurement. Sufficient spare Atlas launch vehicles exist to launch these satellites, but it was assumed that NOAA would be the sole user of Atlas during this period. Thus, there was no cost for the vehicle itself, but there was a cost for maintaining an active launch facility at Vandenburg Air Force Base. After taking into account the above factors, including the capital cost for adapting the spacecraft for shuttle launch, it would cost NOAA an additional 75 million dollars to launch NOAA H, I, and J on the shuttle instead of the Atlas expendable launch vehicles. The shuttle price assumes that NOAA complies with NASA requirements for a "shared" launch in which NASA is responsible for finding a satellite to share the orbiter payload with the NOAA satellite on a 50/50 basis. At the present time, the prospects for such sharing are uncertain. If NASA should be unable to find sharing partners, it must pay the rest of the cost. Thus, the cost to the government could exceed 100 million dollars. It is for this reason that NOAA plans to defer adaptation of polar-orbiting satellites to shuttle launch as long as possible and will therefore launch its next four satellites on ELV's even in the one-polar satellite system.

4. Impacts of Satellite Failure in a One-Satellite System

Q. Several witnesses who appeared before this Subcommittee in February 1982 noted that a one-satellite polar system risks the possibility of a complete lack of satellite data, in the event of failure of the operating satellite.

a. If there were a satellite failure in a one-satellite system, how long would it take to launch a replacement? If there were a launch failure with the replacement, how long would it take to launch a second replacement?

A. Until this time, NOAA has maintained a policy of requesting a launch within 120 days after notification to the U.S. Air Force which provides the launch capabilities at the Western Test Range, assuming launch vehicles are available. Under the reduced polar orbiting program proposed in the FY 1983 budget, there is no provision for early launches. Launches will be scheduled at 18-month intervals. If the last satellite in orbit fails, services will be interrupted until the next scheduled launch. If a replacement satellite fails to achieve orbit, or fails to perform, data services will be interrupted until the next planned launch 18-months later.

Q. b. To what extent does the high resolution data currently being obtained from the VAS sensor on the geostationary satellites replace the need for polar-orbiting satellite data?

A. Though some soundings of the atmosphere are being obtained experimentally from GOES VAS, the capability to acquire and use them operationally does not now exist and will not be available in a fully operational mode for a number of years. GOES does not provide imagery data from the polar regions nor from the Eastern Hemisphere. The polar orbiters provide services not provided by GOES such as APT and HRPT to tactical users and the international community.

IV. Questions of NOAA's Research and Development Budget

1. International Science

Q. You are proposing to cut NOAA's budget for international projects, which includes funding for the Global Atmospheric Research Project (GARP), the World Climate Program, and the Great Lakes Laboratory, from $9 million to $3 million.

a. Why did international science assume such a large share of the proposed budget cuts in FY 1983?

A. International programs were not targeted for reduction but were considered as a part of the overall NOAA program. For example, the GARP/FGGE program was assessed in the context of NOAA's overall weather observation and prediction program. We judged that the funding could be reduced and the timeframe for analyzing FGGE data stretched out while still accomplishing program objectives. The World Climate Research Program was assessed as part of NOAA's overall climate research program. Since the World Climate Research Program is only just beginning, we believe that the program level can be reduced. Specific program requests for projects under the World Climate Research Program will be evaluated as they are defined by the international community. Likewise, the Great Lakes research was assessed in light of overall needs in marine pollution and the decision to reduce support for regionally specific programs.

Q. b. Your budget documents express the hope that other nations may increase their support for these international activities. Do you have any evidence that this will indeed be the case?

A. We know that most of the nations involved with joint science projects have an interest in the continuation of those projects. A specific example is the Arctic Ice Buoy project which has evolved from FGGE and has relevance to weather forecasting and climate. NOAA has been able to negotiate with the weather services of Norway and Canada and with two large oil companies to continue this program and to share the data with NOAA.

2. Great Lakes Laboratory

Q. You are proposing to save $3.6 million by terminating your Great Lakes Laboratory in Ann Arbor, Michigan.

a. How will the proposed elimination of research funds for this laboratory affect the U.S. committment to Article VI of the Great Lakes Water Quality Agreement of 1978?

b. We understand that recently the Environmental Research Laboratory programs were reviewed and the Great Lakes Laboratory received the top rating. Is this accurate? If so, why was this lab proposed to be eliminated?

c. We have received testimony that "termination of GLERL would deprive the U.S. of its only balanced comprehensive research and coordinating agency for one of the country's most valuable resources. It would deprive a number of states of the comprehensive and unbiased assessment of resource use which is critically needed." Please comment.

d. In the FY 1983 budget, EPA is also proposing to eliminate its Great Lakes Laboratory in Grosse Ile, Michigan. In fact, proposed Federal reductions in Great Lakes research are approximately 70%. Did you consult with EPA and other agencies during the FY 1983 budget process so that the impact of your proposed actions on the Great Lakes would be minimized?

A. a. Article VI of the Agreement defines the various lake pollution problem areas that the United States and Canada are committed to address in order to carry out the purposes of the Agreement. The GLERL research relevant to Article VI includes work in the following problem areas: (1) eutrophication; (2) pollution from land-use activities; (3) pollution from shipping activities and other potential sources of accidental discharge of oil and other hazardous substances; (4) persistent toxic substances; and (5) airborne pollutants.

b. The Great Lakes Environmental Research Laboratory was reviewed recently, as are all program within NOAA's Office of R&D, but the laboratories and programs are not rated against each other. Although GLERL did receive a favorable review on the quality of its programs, the decision to close GLERL was based on the fact that its programs are more directly related to state and local needs than some other NOAA activities.

c. NOAA recognizes the importance of the Great Lakes to the nation and the need to continue to do research to help resolve many resource-use conflicts in the lakes. The program at GLERL, however, is more regional in nature than those at the other NOAA laboratories; state and local governments have most of the management responsibility for the Great Lake resource and, therefore, should support any future research activities considered necessary.

d. There were no specific discussions between agencies as to the impact of the FY83 budget on Great Lakes research. The NOAA decision was made based on an evaluation of GLERL in comparison to other NOAA marine and atmospheric laboratories that indicated, in the context of NOAA's mission, GLERL was less critical than others.

3. Weather Modification

NOAA is proposing to eliminate its weather modification program in FY 83.

Q. a. Would you agree that supply of high-quality water, particularly in the West, is probably the most important environmental challenge facing this Nation for the balance of this century?

A. Finding adequate supplies of high-quality water is certainly one of the most important environmental challenges facing this Nation during the next two decades. But there are other important environmental problems that also must be addressed. Natural and man-made contaminants in the atmosphere and marine environment threaten public health and cause millions of dollars of damage to forests, fisheries, agricultural crops, and structures. NOAA is concerned with understanding the transport and transformations of these contaminants that give rise to such problems as acid rain and marine pollution. Severe storms accompanied by tornadoes and flooding threaten populations in many regions of the country. The rapid development and population growth along long stretches of low-lying Atlantic and Gulf coastlines have left large numbers of citizens vulnerable to the destruction and flooding associated with hurricanes. Providing accurate predictions to reduce losses from severe storms is the major challenge to and principal goal of NOAA atmospheric scientists.

Q. b. Does weather modification have the potential to enhance water supply?

A. Weather modification appears to have some potential for enhancing water supplies -- the Weather Modification Advisory Board stated in its 1978 report that it seems probable that a much intensified and steady program of scientific inquiry over the next two decades will yield regionally important increases in mountain snowpack in the 1980's and increased rainfall in areas like the High Plains and Midwest by the late 1980's. They were discussing 10 to 30 percent increases in precipitation. But to date no U.S. project has clearly demonstrated that cloud seeding can produce significant quantities of additional water on the ground. Many operational projects claim success -- and in many cases their sponsors appear to be satisfied with the results -- but these projects are not geared to document their claims scientifically. In a 1978 reevaluation of ten recent projects by a statistical task force established by the Advisory Board, only ane project, an Israeli experiment to confirm the results of an earlier experiment to increase precipitation from winter clouds, was judged to have produced convincing evidence of positive results.

Q. c. Is weather modification not the type of long-term, high-risk research that the Administration claims it will support?

A. For many years researchers believed that major breakthroughs in weather modification were within the reach of short-term development and applications of existing theories and methods. Within the past several years we have come to recognize that modification of cumulus cloud processes (the basis of most summertime needs) is a much more complex problem than we previously thought. Consequently we shifted emphasis within NOAA's weather modification program from cloud seeding experimentation to fundamental investigations in an attempt to provide the physical understanding needed to place weather modification on a firm scientific basis. This approach will require a long-term program of research with no guarantee of success. Because of budget constraints, a need for a better balance between atmospheric and ocean programs, and other priority considerations within NOAA, this program will be curtailed in FY 83. However, we expect to continue supporting cloud and precipitation processes studies as part of our basic program to improve predictions and warnings of weather events. These include our hurricane research program, cloud modeling, cloud research using radar techniques, and cloud sensing research. Many results of this research to better understand processes of the atmosphere will have applications to weather modification objectives as well as to weather prediction.

Q. d. Have you coordinated your cuts in weather modification with the proposals of other agencies? What is overall government picture for weather modification research?

A. The Bureau of Reclamation (BUREC) in the Department of the Interior and the National Science Foundation (NSF) also conduct and support research programs in weather modification. Although cooperation and collaboration between NOAA and these agencies have been substantial in recent years, neither agency was consulted when the cuts in NOAA's weather modification budget were being considered. The decision was based on NOAA programs priorities. Elimination of our weather modification funding will have some impact but it is not likely to be critical to the total effort. We anticipate that BUREC and NSF programs will continue with only minor adjustments in their plans.

Q. e. What results has NOAA obtained from its extensive attempts to modify summer storm clouds in Florida over the past several years? Do these experiments offer any new understanding of our ability to modify weather?

A. The Florida Area Cumulus Experiments (FACE) is a long term experiment to determine the potential of a technique called dynamic cloud seeding for increasing convective rainfall. The FACE field experiments were conducted in two phases between 1970 and 1980. The first phase (1970-76) indicated that the precipitation was increased locally by 45 percent and over the entire target area covering 13,000 km^2 (4800 mi^2) by approximately

25 percent. Because of an extremely wet no-seed (control) day in the sample, the results of the second phase of the experiment are likely to be statistically inconclusive. FACE scientists will continue to analyze the extensive set of data obtained during the field experiments to derive what understanding they can concerning the physical processes involved. Digital satellite imagery is also being examined in an attempt to determine whether seeding in the target area affected the rainfall in the surrounding areas. Preliminary indications are that seeding may have increased the rainfall downwind of the target.

Q. f. Does the Committee on Atmosphere and Oceans (CAO) currently have a Subcommittee on Weather Modification to coordinate the Federal weather modification research effort?

A. The CAO Subcommittee on Weather Modification last met in December 12, 1980. As of now, no future meetings of the Subcommittee have been scheduled.

4. Reorganization

Q. In describing your reorganization plans, you have laid great emphasis on the need for integration of researchers with operational personnel.

a. How will your reorganization plan enhance the integration of researchers and operational personnel?

A. a. The reorganization plan does not enhance the integration of personnel but attempts to integrate research results into operational programs. The integration is handled across a broad range of activities. The new Office of Oceanic and Atmospheric Research (OAR) would be responsible for developing interactions so that researchers know the needs of the operational organization. The OAR would also transfer research results through technical research conferences between researchers and operational staff, technical meetings, publications, and exchanges of personnel. In addition, the OAR would have one program, the Prototype Regional Observing and Forecasting Service (PROFS) that integrates new observational systems, improved mesoscale models, and data display techniques to improve short term forecasts, especially severe storm forecasts. The PROFS program makes use of National Weather Service research and private sector meteorologists to evaluate various products. Therefore, the new OAR would be responsible for planning research based on operational needs, for transtransferring new techniques to operational personnel, and for integrating research results into NWS operational systems.

Q. b. Your National Severe Storms Center is located in Kansas City. Yet your major research effort aimed at improving severe storms forecasts--namely, PROFS--is located in Boulder, Colorado. In light of your reogranization plans, would it not make sense to bring these two facilities together, perhaps in Boulder?

A. b. The PROFS program is only one of several projects in NOAA improving severe weather forecasts. For example, other substantial efforts are ongoing in ERL at Norman, Oklahoma, to improve the accuracy and timeliness of tornado forecasts and warnings; at Miami, Florida, to improve the accuracy of hurricane intensity and landfall forecasts; and in Boulder, Colorado, to improve the spatial and severity accuracy of severe rainfall forecasts. In the National Earth Satellite Service, significant projects are located at Madison, Wisconsin, and Fort Collins, Colorado, to improve forecasts of mesoscale convective complexes, aggregations of severe thunderstorms that are responsible for wide scale, heavy precipitation.

The most rapid advances in severe weather programs are in observing and understanding severe weather events. The PROFS program is responsible for integrating the advances into operationally tested systems that can be implemented in the field forecast offices of the National Weather Service, and forecasters from such operational units will be used to evaluate the new PROFS system modules. For example, PROFS is establishing a prototype forecasters work station in the Denver Weather Service Forecast Office, to be completed in time to participate in the PROFS System Evaluation this summer. Therefore, it is most effective to maintain PROFS at the center of observational and meteorological research and develop ties to make sure that the PROFS products are useful to local forecast offices in Oklahoma, Florida, or anywhere that the NWS provides local forecasting capability. The NSSFC at Kansas City provides centralized guidance services to the local offices. The two are closely coordinated.

5. Closing of the Space Environment Laboratory

Q. You propose elimination of most of the research and services provided by the space Environment Lab in Boulder, Colorado, for a savings of $3.1 million. This facility predicts and researches solar activity and its effect on communications, electric power systems, and safety of air and marine navigation.

a. Which specific services and research currently provided by SEL would be precluded by this proposed cut?

A. NOAA is committed to its centralized responsibility to provide an acceptable level of space environment services to a wide range of users, including many Federal agencies under an interagency agreement and private industrial users and researchers nationwide at whatever level of resources are provided. The following services and research currently provided would be precluded by a reduction of $3.1 million and 34 positions:

1. 24 hour per day alerts and warnings reduced to 8 hours per day.
2. Upgrading of the Solar Environmental Laboratory Data Acquisition and Display System.
3. Space environment instrument maintenance, integration and development

for NOAA and NASA satellites designed for obtaining observational data for application in the space environment services.

4. Computer program development.
5. Publication of Weekly Preliminary Report and Forecast of Solar-Geophysical Data
6. Supporting research to maintain quality of forecasts and implement new techniques.
7. Long-range research to improve services through improved modeling and instrument development.

Q. b. Have you received any indication that other agencies will pick up any of these activities (i.e., NASA, DOD)?

A. No other agency has indicated that it is ready to pick up these centralized services. The USAF Air Weather Service is a joint partner in the operational services of the Space Environment Services Center. The USAF has indicated that it may be forced to maintain some capabilities similar to those of the Space Environment Services Center to meet military mission requirements but would be unable to meet civilian user needs. NASA, FAA, US Coast Guard, US Army, US Navy, DOI, DOE, and GSA federal communications would have to find some other source to meet their requirements if the NOAA services can no longer meet their needs for alerts and warnings with response times of minutes to hours.

NOAA plans to maintain the Space Environment Data Acquisition and Display System, which provides the continuously updated computer data base from which SEL forecaster prepare alerts and warnings. Certain major users have a computer-to-computer link to this data system. During the 8-hour workday (8 a.m. to 4:30 p.m.) alerts and warnings can be provided to users.

NOAA is reviewing alternatives to provide some services during the off-hours.

V. Questions on Ocean Dumping and Ocean Pollution Research

1. Need for Ocean Pollution Research

Q. Why has NOAA cut its ocean pollution research in FY 1983 from $25 million to $12 million? What do you see as NOAA's role in this area?

A. In FY82 the various organizational elements of NOAA will spend approximately $24 million for ocean and Great Lakes pollution research, development, and monitoring work. The estimated corresponding total for FY83 is $13 million. These reductions are being proposed as part of a larger NOAA effort to trim costs by addressing only the highest priority tasks that contribute to fulfilling the agency's various missions. In FY82 NOAA's ocean and Great Lakes pollution program consisted of 16 activities; the FY83 budget will continue 7 activities at the same level and 4 at a reduced level, and add one new research activity for a total of 12.

The role of NOAA in ocean and Great Lakes pollution research, development, and monitoring is defined by the National Ocean Pollution Planning Act of 1978 and that role is to serve as lead Federal agency in the planning and implementation of programs "to develop the necessary base of information to support, and to provide for, the rational, efficient, and equitable utilization, conservation, and development of ocean and coastal resources."

2. National Ocean Pollution Planning Act Oversight

Q. In 1978 Congress passed the National Ocean Pollution Planning Act, which was designed to coordinate ocean pollution research and monitoring. The second revision of the Federal Five-Year Plan for Ocean Pollution research was released this month.

a. The release of the second Five-Year Plan for ocean pollution research was delayed for over one year. Some have contended that the plan was delayed by OMB until after the release of the FY 1983 budget, so that the Plan conformed to the budget request. What did cause the long delay in release of the Plan?

b. GAO is currently assessing the impact of the National Marine Pollution Office. GAO's preliminary findings indicate that the Office has had very little impact in setting budgetary priorities and timetables or in defining ing agency roles. What is your reaction to these findings? Do you believe that interagency coordinating offices such as the National Marine Pollution Office and the National Climate Program Office can serve a constructive role in coordinating the Federal research effort?

A. (a) A final draft of the second Five-Year Plan was completed in July, 1981. That draft contained out-year (FY 1983-85) budget estimates and agency program plans that had evolved largely under the previous Administration and did not reflect the policies and plans of this Administration. The plan was delayed until appropriate changes could be made. These changes largely involved removing out-year budget estimates. A supplement to the plan will be prepared as revised budget estimates become available.

(b) We disagree with GAO's preliminary findings which may be due to a misunderstanding on GAO's part as to how the process of planning and setting priorities works. There are two major aspects to setting budgetary priorities related to marine pollution research, development, and monitoring.

1. Within the domain of marine pollution problems, we go through a two year process to identify national needs, determine which are of highest priority, review agency programs and plans, evaluate adequacy of ongoing and planned efforts, and recommend changes, when necessary. The most visible product of this planning proces is the Five-Year Plan which reflects overall marine pollution priorities that the participating Federal agencies have established, both individually and collectively. During the planning process we often agree with the priorities that a particular agency has established. As unmet

priority needs become apparent during the planning process, agencies propose budget programming or initiatives to fill the gaps which are then considered in the Plan. Finally, there are those cases where new directions are needed. Following are two examples from the second Five-Year Plan where major new directions are recommened and substantive actions are underway:

- OCS oil and gas development. A shift from pre-lease baseline studies to post-lease monitoring for long-term effects.
- Waste disposal management. Evaluation of ocean waste disposal options within the context of regional multi-medium waste disposal strategies.

The implications of these recommendations to budgetary priorities of such agencie as NOAA, EPA, BLM, and DOE are substantial. In addition, NOAA's marine pollution program is directly guided by the priorities established in the Five-Year plan.

2. The Five-Year Plan establishes general priorities related to marine pollution problems. It does not, and cannot, rank these priorities against the other programs of the Federal government. Marine pollution programs must compete for available resources within each agency. The Five-Year Plan provides agency management, OMB, and Congress with an overview of marine pollution priorities to help guide overall budgetary decisions.

We are convinced that interagency coordinating offices such as the National Marine Pollution Program Office serve a constructive role in coordinating the Federal Research effort. Many agencies undertake ocean pollution research, development, and monitoring activities in support of much broader agency missions such as energy development or transportation. NMPPO provides the only available mechanism to pull diverse marine pollution programs together into a common framework. In addition to focused efforts to coordinate high priority initiatives such as those mentioned above, NMPPO facilitates the exchange of program information among agencies which avoids duplication and overlap.

Q. 3. Northeast Monitoring Program

You are proposing to terminate the Northeast Monitoring Program in FY 1983. The August, 1981, NEMP report contained valuable new information about the health of the living resources off the coast of the Northeast U.S., such as:

"...fishery resources of the Western North Atlantic are contaminted with petroleum hydrocarbons and PCBs. Species occurring over a wide range, from the coastal waters of the New York Bight apex to the outer continental shelf-slope break, showed unexpected high levels of these contaminants."

a. Is this program producing new and essential information about our marine fisheries and resources?

b. If so, why is it being terminated?

A. a. The Northeast Monitoring Program has produced some useful information on the health of the waters off the Northeast coast. It was designed by NOAA as a 5-year pilot effort (1980-1984) so that NOAA could evaluate the cost-effectiveness of monitoring the health of the oceans with this type of program.

b. The statement contained on p. 100 of the NOAA budget submission that the Northeast Monitoring Program is to be terminated is misleading. Only funding under the budget line item "Regional Projects and Ocean Dumping Research" will be terminated. The FY83 proposed budget has $1.541M for the program.

Q. 4. Elimination of Research in the Hudson-Raritan Estuary and Puget Sound

You are proposing to eliminate research in the Hudson-Raritan Estuary and in Puget Sound. Your budget documents claim that the nearby States could pick up some of this research, although testimony that we received last week contradicts this claim.

a. Do you have any evidence that the States of New York, New Jersey, or Washington will continue this research?

b. Isn't ocean pollution like acid rain -- an interstate and international problem? If so, doesn't the Federal government have a legitimate role in providing this type of research?

A. a. We have no evidence that the States of New York, New Jersey or Washington will continue this research. We assume, however, that if the research is vital to their needs they will continue it.

b. The analogy is not completely accurate. In some cases, the problems of ocean pollution are quite local with respect to both source and effects. NOAA believes that its research should focus on the generic aspects of ocean waste disposal where solutions would have universal application rather than focussing on local problems.

Q. 5. Ocean Dumping Research

You are proposing to eliminate all monitoring of ocean dumpsites in the FY 1983 budget, including the New York Bight site, the Philadelphia site, and the Puerto Rico site.

a. Do you anticipate that usage of these sites will increase in the future?

b. Will there be a gap in monitoring data on these sites as a result of these reductions?

c. Do you not have a mandate in the Ocean Dumping Act to continue this monitoring?

A. a. The Philadelphia dumpsite became inactive in November 1980 and the Puerto Rico dumpsite in August 1981. The New York Bight 12-mile dumpsite continues to be utilized and the amount of sludge to be dumped at that site is expected to increase as more wastewater treatment plants in the New York-New Jersey region achieve secondary treatment levels. In the wake of the recent court decision on ocean dumping (City of New York v. EPA), both Philadelphia and San Juan have evinced interest in the ocean disposal option for sewage sludge. Other cities have also expressed interest in ocean disposal of municipal wastes.

b. There will be no gap in the monitoring of the active dumpsite in the New York Bight Apex. This is carried out and will continue to be carried out by the Northeast Monitoring Program. The agency views continued monitoring of inactive dumpsites to be of lesser priority and this work will be terminated.

c. Yes. NOAA has under section 201 of P.L. 92-532 an explicit mandate to maintain a continuing and comprehensive program of monitoring and research regarding the effects of ocean dumping of waste materials. NOAA plans to continue with the more critical elements of the Ocean Dumping Program using funds available from the section 202 program and funds available to do research of high national priority under the National Ocean Pollution Planning Act.

Q. 6. Usefulness of NOAA Ocean Pollution Research

During GAO's survey of ocean pollution research, they compiled information on the usefulness of NOAA's ocean research programs to States, localities, and

and citizens. Many of the respondents felt that NOAA's research programs had produced little of value in terms of their needs.

a. Do you agree with this assessment?

b. If so, do you think that the problem lies with NOAA's research or NOAA's salesmanship?

A. a. & b. Research usually requires several years to answer specific questions and because managers and regulatory officials often are unable to anticipate their specific future information needs, at times the two do not converge as well as we would like. (Also see the answer to question V - 2(b).)

7. Interagency Coordination

Section 4(b)(4) of the National Ocean Pollution Planning Act requires that five-year research plans "contain a description of actions taken by NOAA and the Director of OSTP to coordinate the budget review process for the purpose of ensuring interagency coordination and cooperation in (A) carrying our research programs; (B) eliminating unnecessary duplication.

a. Would you describe what actions you and the Administrator of OSTP have taken under this section of the Act?

A. Budget coordination was undertaken through the development of individual agency 5-year prospectuses which were actually mini-5-year plans for each agency. These prospectuses were consolidated as Appendix 1, "Agency Program Summaries", to the Second Five-Year Plan. After consultation with OMB, a matrix of agency programs against ocean pollution issue areas was prepared. The program summaries and matrix were made available to agencies early in the budget year for use in the budget process. Using this information, agencies can track priority problem areas and the extent to which these problems are being addressed by other agencies. Plans are underway to provide for close consultation among agencies, OMB examiners, and NMPPO during preparation of the FY 1984 and subsequent budgets.

VI. Questions Regarding the Environmental Data and Information Service

Q. 1. Computer Procurement

EDIS relies heavily on computers in its roles as archiver and disseminator of environmental data.

a. How severely is EDIS' mission affected by the long lead-time associated with government procurement of computers?

A. Delays in procurring ADP equipment have in some cases caused problems in meeting EDIS mission objectives. Such delays can result in the development of backlogs of incoming data that require pre-processing prior to entry into the National Data Base; difficulty in meeting customer requests for services in a timely manner; and increased costs.

Q. b. What can be done to remedy this situation?

A. (1) Minimize the levels of reviews required before an ADP equipment dependent program reaches the procurement stage.

(2) Provide an adequate workforce to handle the ADP procurement workload.

(3) Organize supporting procurement functions so that they are more responsive to program or mission objectives.

(4) Delegate more procurement authority to program managers.

Q. 2. Climate Data Base

In both FY 1982 and FY 1983, the Administration has cut back on proposals to upgrade the climatological data base at the National Climate Center. The initial proposal was to upgrade the entire climate data base over a 7-year period at a cost of approximately $6 million.

a. What impact will these delays have on the completion data of this project?

A. The major impact will be on users requiring historical data or information derived from those data. Retrieval of historical data will continue to be on a priority-by-project basis and as a result will be slower. The original proposal would have provided a high quality, easily and economically accessible digital data base with the longest possible period of record; high priority historical data sets would have been processed and incorporated into the data base.

Q. b. What is the status of the suggestion to collocate the National Climatic Center, presently housed in an outdated, inefficient facility, with the University of North Carolina at Asheville? This would seem to fit in with your stated interest in integrating researchers and operational elements.

A. In 1981 the General Services Administration surveyed NCC facilities in the Grove Arcade Building and decided it should be rehabilitated at a cost of $9.0 million rather than being housed in new quarters. Our budget for FY 1983 includes $550,000 for engineering designs for the rehabilitation. No further Government efforts are being made toward collocation with the University of North Carolina at Asheville.

Q. 3. Environmental Data Bases

EDIS archives and disseminates data on oceanography, ocean pollution, climate, solar-terrestrial phenomena, and other environmental factors. There are many other data bases both within and outside the Federal government.

a. Do you feel that more could be done to integrate the various environmental data bases?

A. Yes, at present little has been done to integrate environmental data bases from outside the Federal government. The potential benefits of such an integration would be:

(1) To enhance the value of the Nation's environmental data holdings through improved ability to meet the need of end users (e.g., commercial development, government planners, researchers, private users, etc.), and

(2) To reduce the operational cost by use of advanced data processing/communications techniques and equipment in support of an integrated Environmental Data Base as compared to costs associated with multiple discipline or organizationally oriented systems.

Q. b. What specific suggestions would you make in this regard?

A. One important step is to establish a reference system or inventory that would enable data users to identify the existence, location, and conditions of access of any environmental data files of interest, regardless of which organization holds them. EDIS is taking the lead in developing such a system, called the National Environmental Data Referral Services (NEDRES). It will be easily accessible nationwide for computerized searching and through published catalogs. NEDRES will be carefully coordinated with related activities such as the National Climate Program, the National Water Data Exchange, and with state climatologists and other appropriate user groups.

After the environmental data holdings are identified and documented a systems analysis should be performed to determine the feasibility and cost-benefit of integration into an integrated Environmental Data Management System. This systems analysis would chart a course for specific future actions to further integrate environmental data.

c. The Paperwork Reduction Act provides for an office of information management in OMB. Have you discussed the need for improved coordination of environmental data bases with that office? If not, why not?

Yes, EDIS realized the relevance of data coordination activities to the Paperwork Reduction Act and especially the provision requiring a Federal Information Locator System (FILS). EDIS representatives met with OMB in early 1980 to discuss this relationship as well as the possibility of an OMB Circular on environmental data coordination similar to the existing OMB circulars on water data and meteorological services. Further action is uncertain at this time.

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